INDUSTRIAL MEDICINE

Industrial Health, Occupational Diseases and Traumatic Surgery

December, 1942

Employment of Epileptics
— Analysis of the Possibilities —

Methyl Bromide
— Local and Systemic Effects —

Physical Examinations
— Entrance and Return-to-Service —

Types and Frequency
— Of Physical Examinations —

Special Types of Examinations
— Justifying Their Cost —

Carbon Monoxide
— With Particular Reference to Employment —

Women in Industry
— Their Problems of Health —

More About Noise
— Physiological Effects —

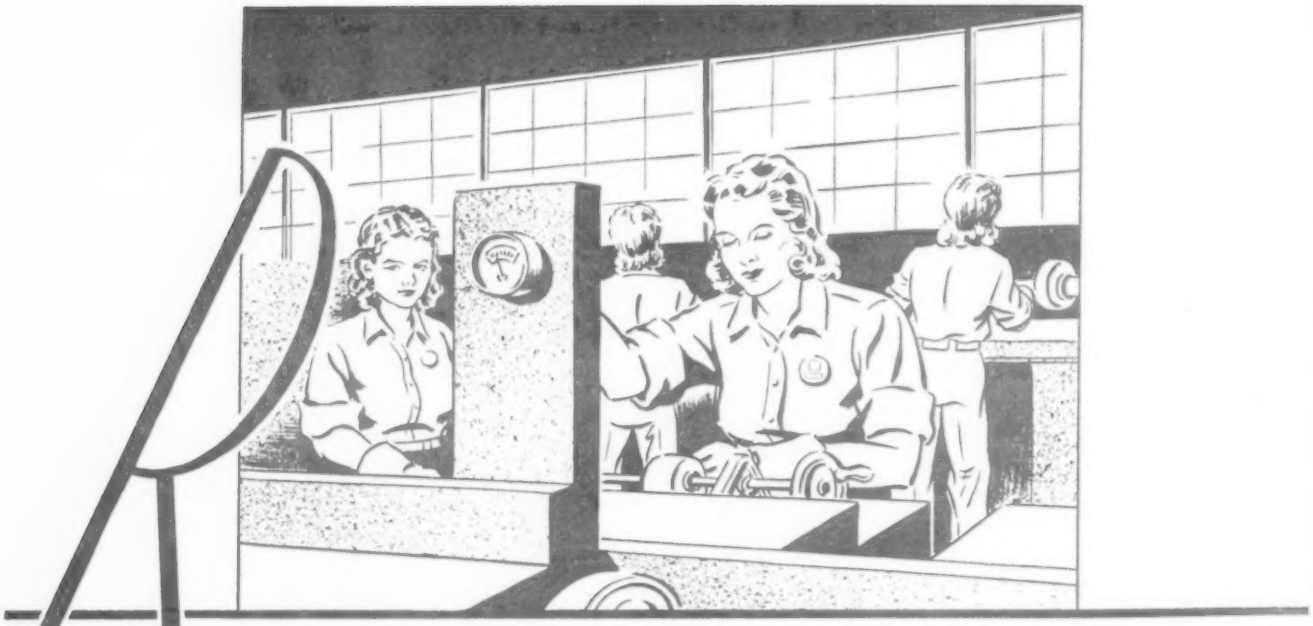
Medical Service Statistics
— Standard Oil's Ten-Year Review —

Industrial Medical Facilities
— In Lycoming County —

Pennsylvania Post-Graduate Course
— In Industrial Medicine and Hygiene —

Work, Regardless
— Handicapped, but Capable —

Volume 11 Number 12



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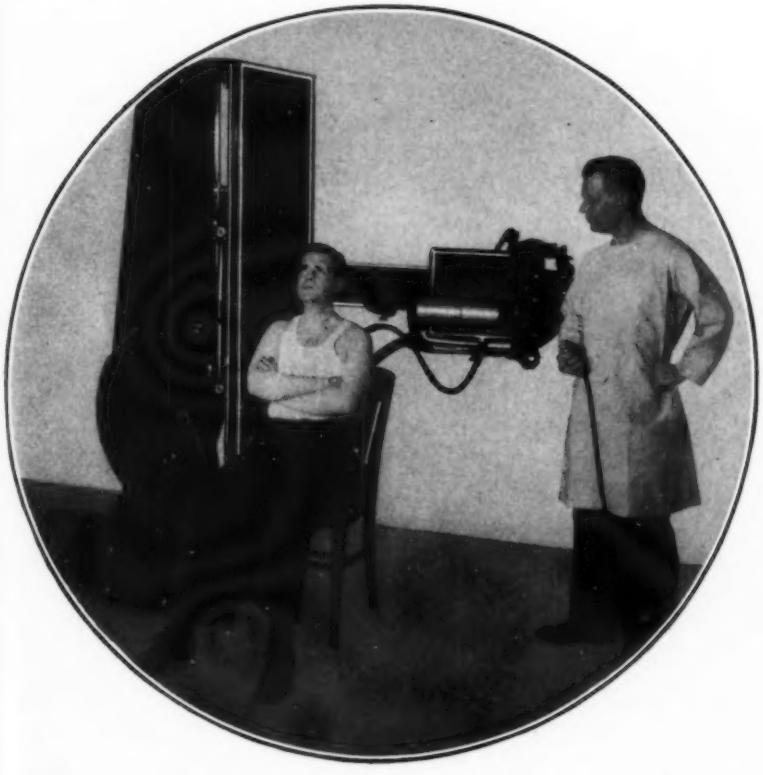

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THE forgotten man among the handicapped" is DR. JOSEPH L. FETTERMAN'S designation of the epileptic. The article on the employability of people thus afflicted, by DRS. LENNOX and COBB (page 571), has a special and timely importance in view of the manpower situation. Inasmuch as the authors mention DR. FETTERMAN'S Auracraft Shop in Cleveland, a glimpse of it follows their article. . . . IT IS GOOD NEWS that Long Island Medical College hopes to repeat its intensive post-graduate course in industrial medicine next semester. This course, in every detail of planning, content, and presentation, is an outstanding example of what such a course should be. One has only to read the lectures, of which there are two more in this issue (DR. CLARK'S was in November) to get the feeling that here is *industrial medicine* in terms of the wisdom that comes from experience and the practical forthrightness which is the essence of a career. The influence of this course, already being felt, will continue to grow. . . . THERE is a deep significance in what is going on in Lycoming County, Pennsylvania. The Industrial Health Committee of that county did a singular and striking thing in getting the state Bureau of Industrial Hygiene to make an appraisal of the local industrial medical facilities (page 598). This is also something that should be emulated. It is not possible, of course, to make similar surveys in every county, nor can every Bureau of Industrial Hygiene afford the time or personnel to do such a job; but it should be done wherever possible. It will be a good idea for all Industrial Health Committees to "Watch Lycoming County." . . .

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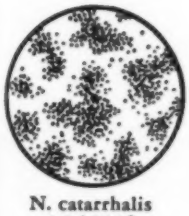
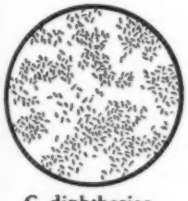
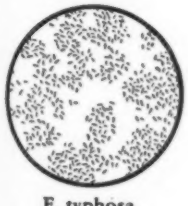


N. catarrhalis
1:84,000*
1:12,000S

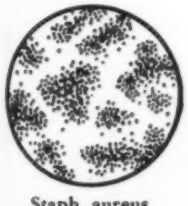
K. pneumoniae
1:49,000*
1:8,000S



C. diphtheriae
1:64,000*
1:14,000S



E. typhosa
1:35,000*
1:3,000S



Staph. aureus
(septicemia)
1:80,000*
1:15,000S

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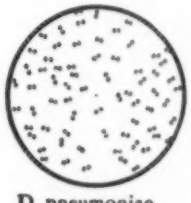
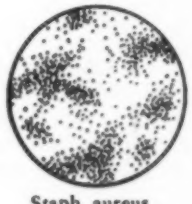
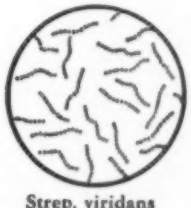


D. pneumoniae
1:120,000*
1:14,000S



Staph. aureus
(osteomyelitis)
1:83,000*
1:13,000S



Strep. viridans
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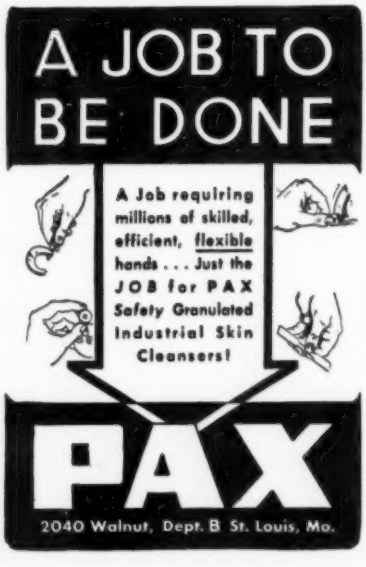
DR. JOSEPH L. FETTERMAN, of Cleveland, Assistant Professor of Nervous Diseases, Western Reserve University School of Medicine, and author of the forthcoming study of trauma and the nervous system, "The Mind of the Injured Man," is now MAJOR FETTERMAN, stationed at Walter Reed Hospital, Washington, D. C.

JOHN F. MC MAHON has been appointed Managing Director of Industrial Hygiene Foundation. This appointment was announced by Andrew Fletcher, Board Chairman, at the Foundation's Seventh Annual Meeting, at Mellon Institute, Pittsburgh, November 10 and 11. MR. MC MAHON succeeds Dr. H. B. Meller, who was forced to retire from active management because of ill health. Dr. Meller will continue to serve the Foundation as Consultant. MR. MC MAHON has been executive secretary of the Foundation since shortly after its organization in December, 1935.

DR. FREDERICK W. SLOBE, Chairman, and DRS. CHARLES DRUECK., JR., MILTON H. KRONENBERG, and LEROY H. SLOAN, are the members of the Committee on Industrial Health of the Chicago Medical Society, recently appointed by Dr. Oscar Hawkinson, Chairman of the Council. This Committee is to undertake a long-range continuous program in the industrial health field. One of its first responsibilities will be to cooperate with the Committee on Industrial Health of the Illinois State Medical Society and the Illinois Manufacturers' Association, together with the Illinois State Department of Health, and the local agencies in Chicago, in the development of an Institute of Health, to be conducted on January 13, 1943, on one of the days of the AMA Congress on Industrial Health, which will convene in January in Chicago.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DR. LOUIS SCHWARTZ, Chief of the Dermatoses Investigations Section of the U. S. Public Health Service of Bethesda, Maryland, will conduct a combined lecture and demonstration course in Occupational Dermatoses in Chicago, beginning January 11, 1943. The teaching period will cover two weeks, the first of which will be devoted to lectures and demonstrations, and the second to plant visits. Dermatologists, industrial physicians and others interested in the course should communicate with DR. EDWARD A. OLIVER, 55 East Washington Street, Chicago. No limit will be placed upon enrollment for the lectures, but the visits to the plants will be limited to 24 enrollees. No fees will be charged.

GENERAL

A BULLETIN from England reports six recent cases of women who were scalped — one fatally — when their hair caught in the stock bars of lathes they were operating. In each case the stock bars were unguarded and the women wore no hair nets or caps.

—*Safety Engineering*, October, 1942.

THE term "first aid" will be applied by the army hereafter only to those medical measures which the individual soldier, aside from the Army's Medical Department, can carry out with the equipment and facilities at his disposal, the War Department announces. For all measures, emergency or otherwise, employed by personnel of the Medical Department, the term "treatment" will be used.

—*The Trained Nurse*, November, 1942.

THE bureau of industrial hygiene of the Michigan Department of Health is conducting a short training course in Lansing for physicians expecting to serve in industry. The first week of the three week course will be confined to didactic work covering the preventive aspects of industrial medicine. The second week will be devoted to field work including visits to industrial plants investigating actual hazards and determining the extent of exposure. During the third week physicians will be assigned to full time medical departments in various industries to observe the actual work of those departments. No charge will be made for any of the work covered during the period but it is expected that those enrolling will defray their own

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living expenses. The plans for the course were developed through the cooperation of the Procurement and Assignment Service; Subcommittee on Industrial Health and Medicine, Social Security Agency; Council on Industrial Health of the American Medical Association; Committee on Industrial Health of the Michigan State Medical Society, and the Bureau of Industrial Hygiene of the state department of health.

NATIONAL Industrial Conference Board's Study No. 46, on "Reducing Absenteeism," is mentioned as follows in *Labor Information Bulletin*, September-October, 1942. "As the report points out one way of conserving man-power is reducing absenteeism. With the addition of large numbers of women workers special steps will need to be taken, for the absentee rate of women is generally higher than that of men, in part because of the woman's household responsibilities which continue even though she takes a job in a war factory. After giving examples of how to keep absence records and how to analyze them in various types of break-downs, the report discusses solutions to problems of absenteeism. Among special reasons indicated for a rise in the absentee rate in war industries are the following: increase in weekly number of hours with premium payments for Sundays (premium pay for Sunday work as such has since been ruled out by the President's Executive Order); higher incomes and decreasing availability of consumers' goods, which together create an incentive to take compensating time off; difficulties of marketing in and around war plants. Among the methods suggested for combating this trend are abolition of premium pay for Sunday work; moral persuasion and patriotic pleas; greater attention to the causes of industrial fatigue; im-

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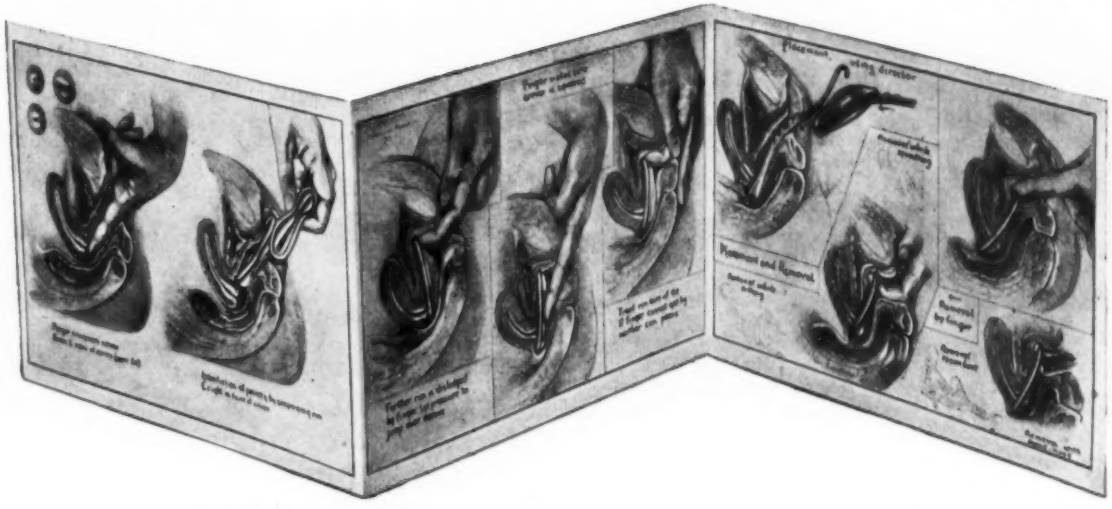

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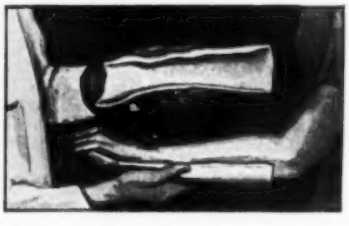

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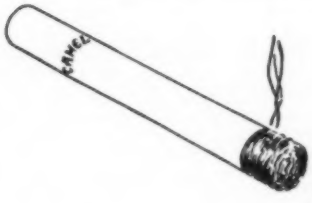
** J. A. M. A., 93:1110—October 12, 1929*
Brückner, H.—Die Biochemie des Tabaks, 1936
The Military Surgeon, Vol. 89, No. 1, p. 5, July, 1941

"THE CIGARETTE, THE SOLDIER, AND THE PHYSICIAN," The Military Surgeon, July, 1941. Reprint available. Write Camel Cigarettes, Medical Relations Division, 1 Pershing Square, New York City.



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CLINITEST

These 3 Simple Steps Require Less Than One Minute!

1 5 drops urine *plus* 10 drops water

2 Drop in tablet

3 Allow for reaction and compare with color scale

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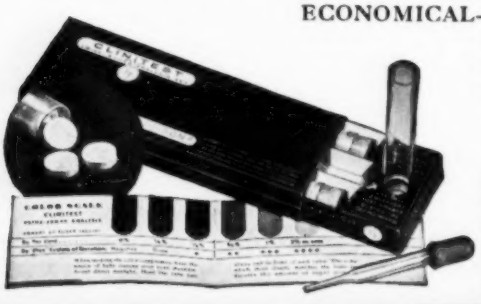
DEPENDABLE—CLINITEST Tablet Method is based on same chemical principles involved in the standard copper reduction tests—*except*—no external heating required, and active ingredients for test contained in a single tablet. Indicates sugar at 0%, ¼%, ½%, ¾%, 1% and 2% plus.

ECONOMICAL—Complete set (with tablets for 50 tests) costs patient only $1.25. Tablet Refill (for 75 tests)—$1.25.



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CLINITEST Urine-Sugar Test and CLINITEST Tablet Refill are available through your prescription pharmacy.

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no change. In the 11 who received no B complex, there was no change in the amount of time it took to cause tiredness of the nervous system. Further, of the 12 who received the vitamin B complex all felt better, while only one of the 11 who received no B complex felt any better.

—*Chicago Daily News*, November 17.

DR. BEN FREES, one of the leading industrial surgeons of Los Angeles, speaking before the Casualty Adjusters Association of that city recently said that, while the Army has said that no doctor will be taken by the selective service boards who is past 45, some *industrial surgeons* will be taken from plants in 1943. Speaking of what adjusters and companies can do to reduce the work of the industrial surgeon, DR. FREES said: "The paper work required in individual cases has been a nightmare to the average doctor. Systematize. Make this a routine procedure. The doctor's report by law must go to the state officials. Give this report due consideration, for on it the insurance company pays." He said that minor injuries compose the bulk of the accident cases, but every traumatic wound is potentially an infected one and tetanus serum should be used in treating the majority of them. On the importance of good nursing he said: "Nurses in industry must have a wider scope of training than any other type of nurse. The industrial surgeon should get the best nurses possible. He should surround himself with the best staff obtainable in his community."

—*New York J. Commerce*, November.

THE National Association of Manufacturers in the United States estimates that the annual cost of an adequate health program for a 500 employee factory is $13.46 per worker per year. The cost, of course, varies with the size of the plant and the extent of the program inaugurated, and may range from $5.00 to more than $13.00 per man per year. This per capita cost of health maintenance is usually below average in the larger industrial plants, slightly above average in the smaller ones, but no plant is too small to benefit from a program of sickness prevention. DR. H. M. HARRISON, Toronto, reports the operation of a health conservation program for 425 employees at a yearly cost of about $1,700.00—$4.00 per employee per year. Cooperative methods are useful in providing medical service for smaller plants at a minimum cost. In one Ontario center, a cooperative nursing system for small plants of between 100 and 300 employees has been set up. Graduate nurses make visits of about two hours to several plants daily; give advice on personal hygiene, accident prevention, check up on the absentees, do necessary surgical dressings, etc.

—*Canadian Business*, October, 1942.

A POSTGRADUATE Institute entitled "Industrial Problems in Medical Practice" was held at the Harvard Club, November 7, under the auspices of the state medical society. The subjects were:

"The Value of Pre-employment Examinations"—DR. DANIEL L. LYNCH, Boston.

"The Personality of Industrial Applicants"—COMMANDER A. WARREN STEARNS, M. C., U. S. Naval Reserve, Boston.

"Toxic Fumes and Gases in Industry"—DR. ALAN R. MORITZ, Boston.

"Industrial Dermatitis"—DR. JOHN G. DOWNING, Boston.

"Injuries to the Eyes"—LIEUT. COMDR. EDWIN B. DUNPHY, M.C., U. S. Naval Reserve, Boston.

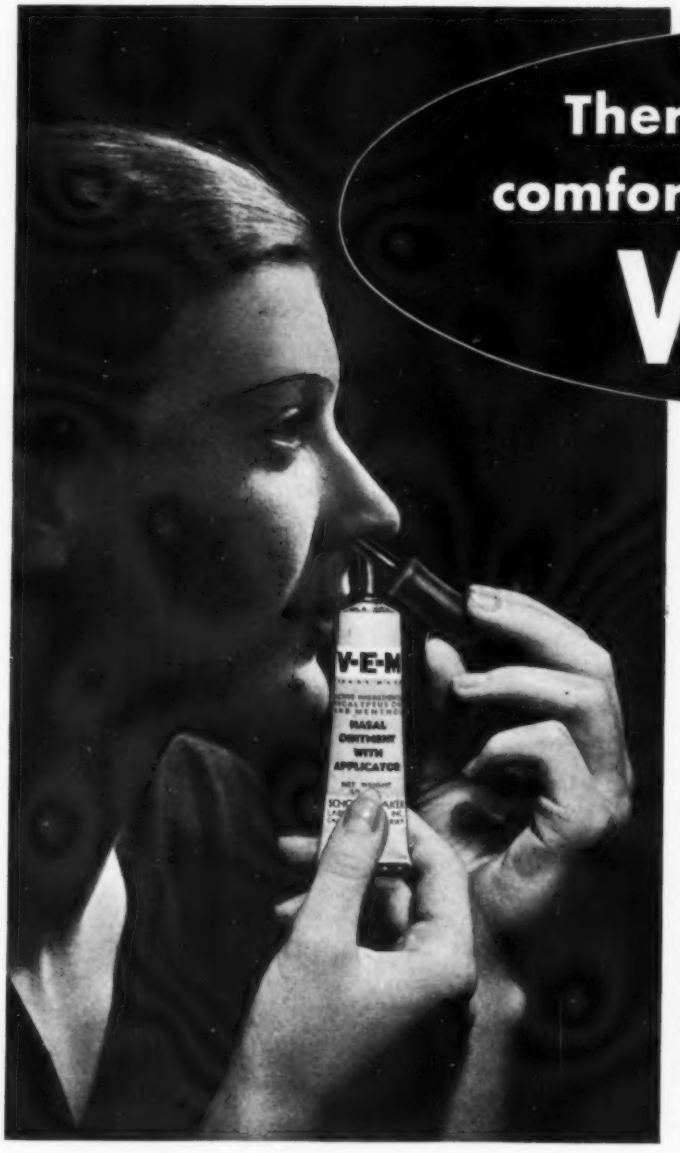
"Examination and Diagnosis of Lame-Back Conditions"—DR. FRANK R. OBER.

"Responsibility of Physicians to Industry in Winning the War"—LIEUT. COL. ANTHONY J. LANZA.

"Sterilization in Operating Rooms"—DR. CARL W. WALTER.

A round table discussion on the treatment of burns was held by DRS. EDWARD D. CHURCHILL, S. HOWARD ARMSTRONG, JR., OLIVER COPE and CHARLES C. LUND and one on the modern treatment of wounds by DRS. CHAMP LYONS, HENRY C. MARBLE, JOSEPH H. SHORTELL and GORDON M. MORRISON, all of Boston.

AMERICAN College of Physicians announces, through its Board of Regents, the cancellation of the 1943 Annual Session, scheduled to be held in Philadelphia, April 13-16, 1943. This action was taken after thoughtful consideration of all factors involved, including an intimation from the Secretary of War and the Office of Transportation that larger national medical groups should not plan meetings at the time set; a growing difficulty in getting speakers and clinicians of top rank to maintain the usual standards of the program; and a prospect of greatly reduced attendance, because civilian doctors are faced with too great a burden of teaching and practice and a decreas-



There's a lot of comfort in a tube of V-E-M

Now, when it is so necessary for everyone to be most efficient in his daily work, the practice of nasal hygiene with V-E-M makes proper breathing easy and adds to one's comfort whatever his task may be.

V-E-M can always be recommended as a pleasant relief for the stuffy noses of simple head colds and for other annoying nasal conditions often caused by the dry air of heated homes and buildings, quick changes in temperature, inhaled dust, soot, fumes, pollen and air borne droplets in crowded places. V-E-M soothes and lubricates the accessible nasal membranes, depositing a partially protective film; it quickly clears the nasal passages of temporary congestion; it sweetens the exhalation of breath through the nose; it softens crusty accumulations; in short—

V·E·M MAKES THE NOSE FEEL COMFORTABLE

Many benefit by snuffing V-E-M up their noses morning and night. It is pleasant and takes but a moment. The Patented Applicator, included in the regular consumer package, on sale at all drug stores, is handy for placing a measured amount of V-E-M high up in the nose. Save the applicators which last indefinitely. Others prefer to squeeze V-E-M from the tube onto the tip of the little finger and snuff it up the nose. Once you try V-E-M, you will feel like recommending it. It has given comfort to a lot of people.

As long as possible we shall be glad to send you a generous Free Sample of V-E-M. Because of rubber conservation these samples will not include the applicator. Mail coupon today, or postcard request.

PRACTICE NASAL HYGIENE WITH V·E·M

Oil of eucalyptus 6¼ gr., menthol 1½ gr. in each av. ounce.

Used by Physicians for 27 Years

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The diagnostic search usually required in the eradication of pruritus vulvae, though at times lengthy, need not deprive the patient of urgently demanded relief. Acting promptly and for prolonged periods, Calmitol Ointment alleviates the tormenting discomfort and soothes distraught nerves, regardless of the underlying cause. The psychic complications so frequently seen in pruritus vulvae are thus prevented. Scatching is obviated, reducing local traumatic insult and discouraging spread of the original process.

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Calmitol contains chlor-iodo-camphoric aldehyde, levo-hyoscine oleinate, and menthol, incorporated in an alcohol-chloroform-ether vehicle. Pruritus is controlled through its blocking action upon cutaneous receptor organs and nerve endings. Calmitol is protective, bacteriostatic, and induces mild active hyperemia which aids in disposal of toxins.

CALMITOL THE DEPENDABLE ANTI-PRURITIC

ing active membership, owing to approximately 25% of all doctors being called to active military service. President James E. Paullin announced, however, that all other activities of the College would be pursued with even greater zeal, and that the College would especially promote regional meetings over the country and organize post-graduate seminars in the various military hospitals for doctors in the Armed forces.

THE Sedgwick County (Kansas) Medical Society has approved a proposal of the state board of health to examine industrial employees in Wichita in an effort to detect the presence of tuberculosis. The state board is using a 35 mm. photo x-ray unit. The pictures are projected on a screen and all doubtful cases are re-examined on a standard 14 by 17 plate. When tuberculosis is suggested, the patient is sent to his family physician for diagnosis and treatment. Examinations are voluntary and will be given at the various plants on company time.

TYPICAL of the most effective safety and medical programs are the following brief outlines of the organizations within two of the largest yards. Yard A: Yard has a safety department consisting of four full-time engineers. All new employees are given a safety lecture before going to work. Safety is stressed in all training courses. All injuries are investigated and analyzed statistically. Safety goggles are supplied and required to be worn for all welding, grinding, chipping, and drilling operations. A small hospital and two first-aid clinics, staffed by five doctors and 16 nurses, are maintained within the plant. The frequency rate for this yard was 11.1. Yard B: A full-time safety engineering department is maintained. All new employees are given a safety lecture. Safety representatives are appointed among the workers in each department. Weekly plant and departmental safety meetings attended by worker delegates are held. Every lost-time accident is investigated and analyzed statistically. Employees who normally wear glasses are required to have safety lenses. Safety goggles or glasses are required in all eye-hazard operations. Safety shoes are required in the steel mill and recommended elsewhere. Three first-aid stations, staffed by a doctor, three first-aid men, and four nurses, are maintained in the yard. Serious cases are treated in a yard hospital, staffed with eight doctors and a number of nurses. The 1941 frequency rate for this yard was 20.4.

—From "Shipyard Injuries and Their Causes," *Monthly Labor Review*, October, 1942.

TOO many doctors still believe that industrial medicine requires no special preparation and that it can be practiced with the left hand, as it were, while with the other they continue their private practice. I assure you this cannot be done. The practice of industrial medicine is a separate profession and one which requires special training if industry is to receive the benefits which it has the right to expect. The education of the industrial physician today includes, in addition to his regular training as a doctor of medicine, such subjects as the engineering of ventilation, lighting, heating, and sanitation. He must have a knowledge of the ingredients and disease-causing qualities of the materials and processes used in the industrial organization. He must have a knowledge of plant sanitation problems and their solution, of working conditions, of accident and occupation disease prevention methods, and of preventive health measures in general.

—DR. VICTOR G. HEISER, in *Connecticut State Med. J.*

AN INDUSTRIAL nutrition advisory service has been organized under the direction of Dr. William H. Sebrell, Jr., director of the division of chemotherapy, National Institute of Health, and deputy assistant director, Office of Defense Health and Welfare Services, and Milburn L. Wilson, M.S., assistant director in the Office of Defense Health and Welfare Services. This service will provide practical recommendations to both government-owned plants and private industries to meet specific industrial nutrition problems which may affect production by increasing accidents. Dr. Robert S. Goodhart, New York, will direct the nutrition advisory service to industry.

Malnutrition is America's real fifth columnist. Malnutrition—caused by ignorance, faulty food habits, irregular and abnormal working hours, overcrowded cafeterias and steam-table meals—is stealing the strength of America's war workers.

Malnutrition, the "silent sickness," may lie back of your health and absentee records, back of colds and headaches and "indigestion" and the sluggish carelessness that leads to accidents.

EDUCATION...OR SPEED?

Workers and their families *should* be educated to choose the right foods and prepare them properly. But education is a long, slow process, and America cannot wait five years—or even one. Education may eventually influence the person who packs the worker's lunch box and prepares his home meals. *But you have a faster, more direct way of reaching the worker himself!*

SUPPLEMENTATION...NOW!

In this emergency, dietary supplementation offers a direct road to a stronger nation... an effective way of combating the fatigue, the colds, the impaired efficiency that may result from "below-borderline" diets.

A BALANCED SUPPLEMENT

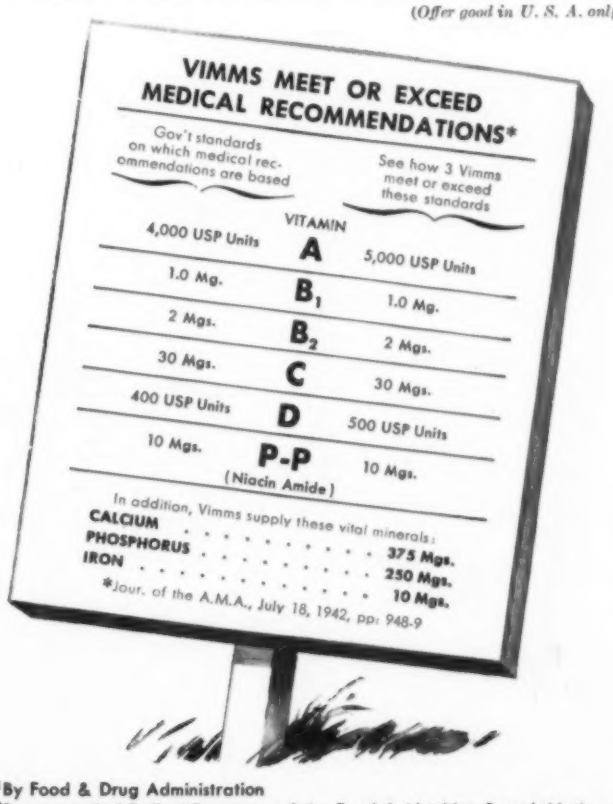
These points should guide the choice of a supplement:

1. Deficiencies of single vitamins seldom occur. Therefore a complete supplement will provide *all* essential vitamins. And Vimms do.
2. Minimum daily requirements have been established by the Government.[1] An adequate supplement will meet these requirements. Vimms do.
3. Medical Councils have established the proper ratios for compounding supplements. Vimms are *balanced* according to these ratios.
4. A *complete* supplement provides vital minerals. Vimms do—they offer Calcium, Phosphorus and Iron.

Vimms are pleasant to take, too, and low in cost. But most important of all, three Vimms tablets will *make up the difference* between what your average worker may get in his regular meals, and the vitamins and minerals he should get[2] for top-notch working efficiency and vigorous health.

If you wish clinical samples of Vimms, write to Lever Brothers Co., Dept. I.M.-2 Pharmaceutical Division, Cambridge, Mass.

(Offer good in U. S. A. only)


VIMMS MEET OR EXCEED MEDICAL RECOMMENDATIONS*
Gov't standards on which medical recommendations are based
See how 3 Vimms meet or exceed these standards
VITAMIN
4,000 USP Units A 5,000 USP Units
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2 Mgs. B2 2 Mgs.
30 Mgs. C 30 Mgs.
400 USP Units D 500 USP Units
10 Mgs. P-P (Niacin Amide) 10 Mgs.
In addition, Vimms supply these vital minerals:
CALCIUM . . . . . 375 Mgs.
PHOSPHORUS . . . . . 250 Mgs.
IRON . . . . . 10 Mgs.
*Jour. of the A.M.A., July 18, 1942, pp. 948-9

[1] By Food & Drug Administration

[2] Recommended Daily Allowances of the Food & Nutrition Board, National Research Council.

COMMENT and OPINION

THE industrial surgeon recognized a number of frills in the form of time expended in listening to the complaints of questionable injury cases—as for example, the strong man with a weak back and a weekly compensation check. Since the era of industrial insurance an appreciable percentage of the surgeon's time is being taken up by these bothersome cases of "compensationitis." This situation will perforce be corrected when more serious casualties appear.

—From "What About Frills?" Editorial in *Rocky Mountain M. J.*, October, 1942.

OPPORTUNITIES in industry far exceed the number of available women. Government spokesmen and private industrialists agree that the implements of victory must be manufactured in large part by woman power. Aircraft plants, ordnance factories, and industry in general are using large numbers of women, and are far more solicitous of their physical well being than in peace time. Most of these industries are glad to employ able women physicians, and many of these positions will outlive the present emergency. To anyone interested in industrial hygiene a new career is opening up.

—From "War Services for Women Physicians," by MARION JOSEPHI, M.D., in *Medical Woman's Journal*, November.

AS EVERYONE knows, the Army and Navy have made serious drains on medical ranks. Industry must keep its health programs going, and it should do this by training both women doctors and men doctors physically ineligible for military service. With a few outstanding exceptions, there are practically no women doctors in the industrial field, but management must open its doors to them.

—DR. VICTOR G. HEISER.

SERVICE in war industries today is not only essential; it is a service one can render without sacrificing professional dignity. Industrial hygiene, as well as industrial surgery, are becoming specialized fields in medicine. . . . This field is calling for capable men to assume serious professional responsibilities. *The call is not for incapable men to take a job.* Young doctors who are unable to obtain a commission in the Army or Navy should give serious thought to this field of service at this time.

—Editorial, *J. Tennessee State M. A.*, October, 1942.

THERE is a mental side to smoking which nobody should forget. MacArthur, in a recent conference in Australia, smoked five cigarettes in an hour and a half. President Roosevelt, Winston Churchill, Donald Nelson, Cordell Hull, General Knudsen, Admiral Hart, Chiang Kai-shek, Sir Stafford Cripps all smoke regularly. Incidentally, Hitler, Mussolini and Hirohito do not.

—*J. Med. Soc. N. J.*, quoted in *Southwestern Med.*, September, 1942.

IT IS WELCOME news that the medical profession is giving serious consideration to "the special problem of war industry—fatigue." DR. MORRIS FISHBEIN, editor of the American Medical Association's *Journal* has offered this assurance to the National Safety Congress. Fatigue, like ill health, often is associated with industrial accidents, says DR. FISHBEIN. Physical and mental breakdowns among workers increase when they are "driven far beyond their capacities." He adds this somewhat curious statement: "We know that little can be gained and probably more will be lost when working hours in any week exceed 60 to 65 for men and 55 to 60 for women." As an abstraction, that's certainly true, and we think most authorities would say that a work week of 60 hours for men and 55 for women is too long for safety and efficiency in most occupations. The wartime average work week in Great Britain is 56 hours. But our own Labor Department's statistics certainly do not indicate that American workers are being "driven" in such extremes of toil as DR. FISHBEIN considers unwise. The average work week in all American manufacturing industries is still less than 43 hours. In only one occupation—toolmaking

TO INDUSTRIAL HOSPITALS AND FIRST AID STATIONS

250 Envelopes

Each containing 2 Anacin Tablets

$2.83 less 2% cash 10 days.

ANACIN *Relieves Pain Promptly* due to simple Headaches and minor Neuralgia

Keep the Employee on the Job by providing Quick Relief from Pain due to simple headaches, minor neuralgia and pain and discomfort associated with regular menstrual periods.

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Please send me _____ containers of 250 envelopes each at $2.83 less 2% cash 10 days.

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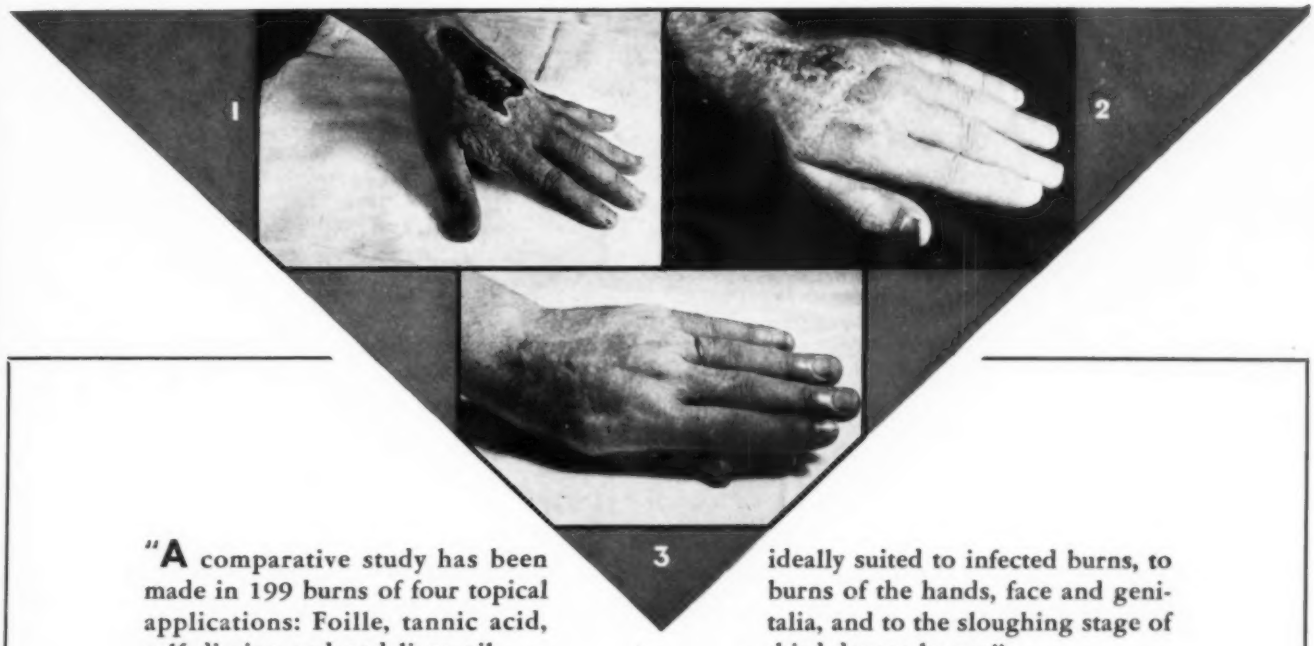
IN 3rd DEGREE BURNS

*"Significant Reduction of Healing Time"**



"A comparative study has been made in 199 burns of four topical applications: Foille, tannic acid, sulfadiazine and cod liver oil . . .

"Foille is superior to the other agents in the following respects: (1) Simplicity of application; (2) it significantly reduces the healing time of third degree burns; (3) it acts as a detergent for grease and oil, and (4) it forms a soft, mildly antiseptic, easily changed coating, ideally suited to infected burns, to burns of the hands, face and genitalia, and to the sloughing stage of third degree burns."

We invite physicians to write for literature and clinical samples of Foille.

LEGEND FOR ILLUSTRATION

1. September 1, 1939. 3rd degree burn. Beginning treatment with Foille.
2. Progress after two weeks' treatment.
3. November 21, 1939. Hand completely healed with minimum of scar tissue contracture or loss of function.

MINE SAFETY APPLIANCES COMPANY, PITTSBURGH

Exclusive Distributors to the First Aid Field

CARBISULPHOIL COMPANY

DALLAS, TEXAS, U. S. A.

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*Hamilton, J. E., A Comparative Study of Local Burn Treatments, Amer. Jl. Surg.: Dec., 1942

OFFICE, clinic and industrial surgery demand the same painstaking safeguards against infection that prevail in the modern hospital. Pelton has been providing the profession with these safeguards for 42 years.

Choose a Pelton Sterilizer and be sure of maximum sterilizing safety—plus efficient, enduring service.

THE PELTON & CRANE CO., DETROIT, MICHIGAN
Established 1900

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—is it more than 50 hours. We are experiencing alleged shortages of labor, and there is talk of compulsory service as a remedy. But laws and union contracts designed to spread the jobs at a time when unemployment was the great national problem are still in effect. We are still very far from approaching, let alone exceeding, DR. FISHBEIN'S limits.

—*Evansville (Indiana) Press*, November 7.

WE MUST parcel out our medical skills in the wisest possible manner to meet war needs on the civilian front. Every community must look about for new ways to use every available resource for health protection. Rationing of medical service may be needed. The stamp-book method would not work because you cannot ration sickness. The best way to meet the emergency would seem to be to exercise some control over the movement of physicians both into and out of civilian practice, plus more "pooling" of medical services, hospital facilities, and nurses in the community.

—PAUL V. MCNUTT, quoted in *Chicago (Illinois) Sun*, November 11.

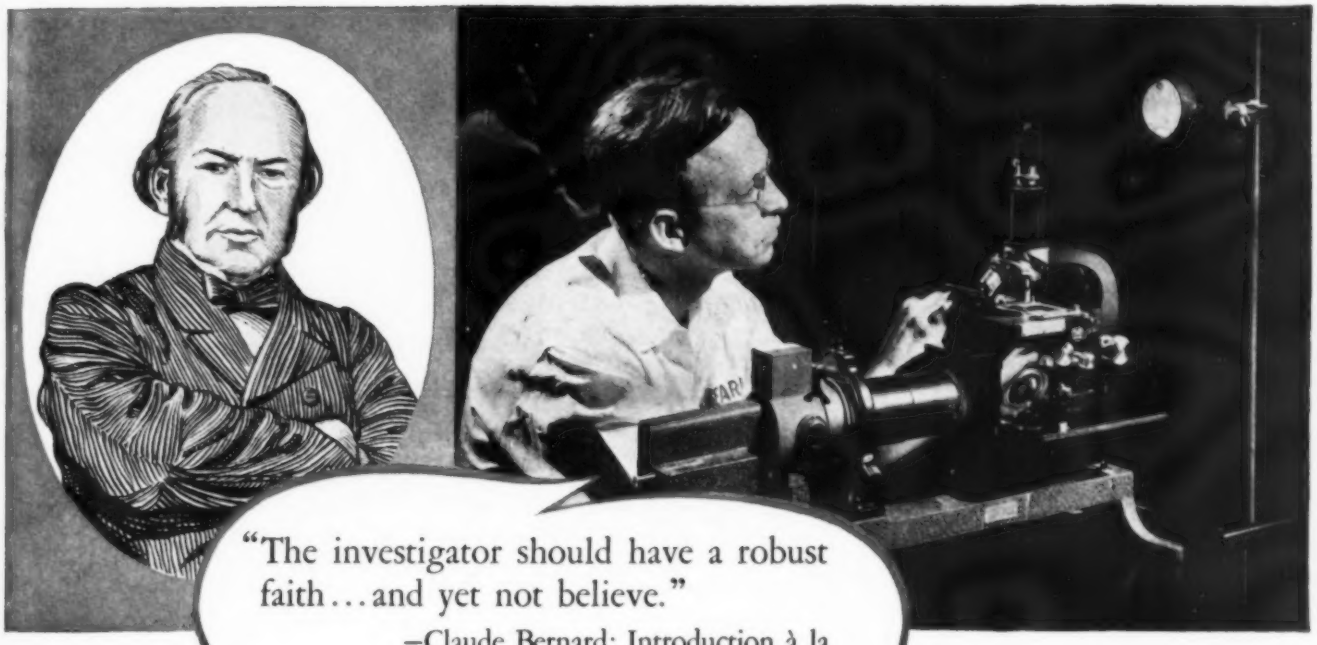
IF COMPULSORY state medicine is passed, the politicians will be in control and will order physicians around. The fine relations that exist between patients and physicians will disappear. Progress and advances in medicine will cease, and chaos will arise. Perhaps some physicians will benefit by this for they will work short hours and receive a fair salary. Compulsory state medicine would take in hospitals, physicians, nurses, pharmacists and everything else that has to do with medicine. This would involve an expenditure of somewhere in the region of $3,500,000,000 to $5,000,000,000 (which would be controlled by politicians). Physicians must take a determined interest in this matter and definitely express an opinion. California has already defeated such a measure—physicians, hospitals, nurses and pharmacists must awake and act, not tomorrow but now.

—From "Political Responsibility of Physicians," by HENRY M. LANDESMAN, M.D., in *New England J. Med.*, November 5, 1942.

IF EMPLOYEES are able to secure some beverage, preferably milk, and a light snack during a brief rest from their work, efficiency will increase because of the renewed vigor with which men return to work after a short period of relaxation, and another sound nutritional practice will be established. This, too, is a simple measure, but the returns from adequate nutrition can hardly be estimated. Stuart Chase, in his new book, "The Road We Are Traveling," describes a British Army experiment with young men, rejected from service because of poor health, who were put in a special camp and given good, nourishing food for six months. "They were then re-examined by the medical authorities, and 800 of them promptly passed the army tests."

—From "The Next Job for Management: Smashing the Health Bottleneck," by *Kingsley Roberts, M.D.*, in *Personnel Administration*, October, 1942.

ABSENTEEISM this year will cost war industry 121,000,000 man-days, the equivalent of $1,000,000,000 in wages to war workers and enough time to build 5,000 Flying Fortresses at the present rate of production, DR. VICTOR G. HEISER, medical consultant to the National Association of Manufacturers' Committee on Healthful Working Conditions, declared in Boston on October 29. Despite "industry's best efforts to forestall every possibility for accidents on the job," Dr. Heiser said, "42,600 war production workers have been killed, either on or off the job, since Pearl Harbor. Add the number injured and the record is this: 11,000 war workers killed or injured on and off the job every day since December 7." Fatigue and malnutrition contribute to the record, said Dr. Heiser, who long has championed *industrial nutrition* educational programs. He said America spends $9,000,000,000 for 130,000,000 tons of food every year "and yet we find that approximately three-quarters of our wage-earning families—like so many of the rest of us, I fear—pay so little attention to what constitutes good diet that they must be classified as



"The investigator should have a robust faith... and yet not believe."

—Claude Bernard: Introduction à la medécine expérimentale, 1865

Microprojection Unit Used in Searle Research Laboratories.

IT HAS been said that the research chemist must be born to the job, for the qualifications are many and exacting. Not the least is a tenacity which spurs him to turn over every stone, read every publication, follow every clue bearing on the subject being investigated.

In their efforts to provide the medical profession with new and better products, improved standardization, painstaking manufacture, Searle Research Chemists keep the background and tradition of the investigator alive—for in the Searle Research Laboratories nothing is left to conjecture.

In the Searle Research Laboratories such Searle products as the following have been made available for the service of the medical profession:

SEARLE AMINOPHYLLIN—NNR—pioneer American product, used extensively in paroxysmal dyspnea, bronchial asthma, Cheyne-Stokes respiration, certain cardiac conditions. In tablet, ampul, and powder forms.

SEARLE METAMUCIL—"smoothage" treatment for constipation; bland, non-irritating; palatable, easy to mix. 1 lb., 8 oz. and 4 oz. containers.

SEARLE KETOCHOL—modern development for management of gall bladder dysfunctions; provides marked hydro-choleretic action with freedom from toxicity. Bottles of 100 and 500 tablets.

SEARLE FLORAQUIN—completely restorative treatment for vaginal infections. Powder, bottles of 1-oz. and 8-oz.; tablets, boxes of 24.

SEARLE FURMERANE—effective antiseptic for general use. Solution, Tincture, Ointment and Nasal Drops with Ephedrine.

SEARLE GONADOPHYSIN—improved gonad-stimulating factor from the anterior pituitary gland. In dry, stable form in ampuls.

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BEFORE AND AFTER "I AND D"

Formula: Chemically pure Glycerine 45.000%, Iodine 0.01%, Boric Acid 0.1%, Salicylic Acid 0.02%, Oil of Wintergreen 0.002%, Oil of Peppermint 0.002%, Oil of Eucalyptus 0.002%, Kaolin Dehydrated 54.864%.

The Denver Chemical Mfg. Co., New York, N. Y.

BEFORE and after Incision and Drainage, for superficial infection, Antiphlogistine is a valuable aid.

BEFORE—Antiphlogistine, because of its formula and ability to retain "moist heat", not only helps speed up localization of pus but also relieves the pain and discomfort that is usually present.

AFTER—when applied after Incision and Drainage, Antiphlogistine helps bring about resolution of the inflammatory reaction, evacuation of the pus and the necrotic tissue, and a return to normal.

This is why Antiphlogistine is especially qualified for treatment of boils, carbuncles and infected wounds. There are no systemic reactions—it may be used in conjunction with chemotherapy.

Antiphlogistine

'ill-fed,' according to recommended standards of good nutrition."

—*Commercial & Financial Chronicle (New York)*, November 5.

DOCTORS who value their work obtain the patient's history, examine him, give thought to his case, devise prescriptions for the particular needs of the individual, and even when the patient is not there, they give unseen service in record, reference and weighted consideration. An easier path is open to any who choose to claim directly on the Fund. By concentration on attendances, taking care to claim for every time a patient appears, by hurrying round on brief, solicitous visits, and sticking to the stock prescriptions of the New Zealand Formulary, he will obtain more payment than ever before. The New Zealand Branch of the British Medical Association never has believed in such sacrifice of quality for quantity. It is for this reason that the Council of the Branch advised its members to "practise as hitherto," giving every thought to the patient.

—From "The Rubaiyat and Social Security Medical Services," by *J. P. S. Jamieson* in *New Zealand Med. J.*

THE study of industrial health problems began after the last war and has now assumed a major field in our scheme of industrial efficiency. Instead of using merely first aid and rehabilitation following accidents, accident prevention, industrial hazards and diseases are being brought under control, and the loss of working days from sickness and accident has been reduced from a high point of 30 to a new low of eight or less.

—DR. MAYNARD A. AUSTIN, President, Indiana State Medical Association, September 30.

IN New York State, 0.9 to 1.3% of all selective service registrants have been rejected because of tuberculosis; in Pennsylvania, 2% have been rejected. Those military rejectees who are active cases should not be allowed to swell the tuberculosis case rates in industry. But at least 75% of the early active cases of tuberculosis can be discovered only by x-ray examination. The purpose of the x-ray examination as of all physical examinations in industry is to assign men to work in accordance with their capabilities and not to exclude them from employment. The rights of the workman to employment must at all times be scrupulously observed except where such employment would endanger the lives of his fellow employees. The employees are entitled, however, to protection from contact transmission of tuberculosis as well as other communicable diseases. All history teaches us that the risks of such diseases increase tremendously in war time, and efforts for this protection should be redoubled. To find tuberculosis effectively in the most economical manner, the routine physical examination must include chest x-ray study.

—DR. L. M. PETRIE, Director, Georgia Industrial Hygiene Service, in *J. Med. Assn. Georgia*, October, 1942.

IT IS ALWAYS admitted that medical care is never denied anyone who needs it, and that in a very large percentage of cases the question of payment is the last consideration. The profession itself has developed this code of financial ethics. In no other branch of organized society is a commodity sold on so little credit information. The refusal or inability to pay bills means a drastic complete cut-off of service in all other lines, but never where medical care is needed is it refused because of lack of ability of the patient to pay. At least we can assume that this is the recognized custom of the medical profession, and the exceptions are certainly far fewer than are the exceptions in other lines to the recognized ethics of good business. One can say this without decrying big business. Business on large lines is essential; large fortunes are not incompatible with organized society. It is American and sound to believe in individual initiative and the result gained therefrom, and that the largest progress in every line results from such individual initiative. Every act of organized society and government that weakens or defeats individualism and initiative, is a

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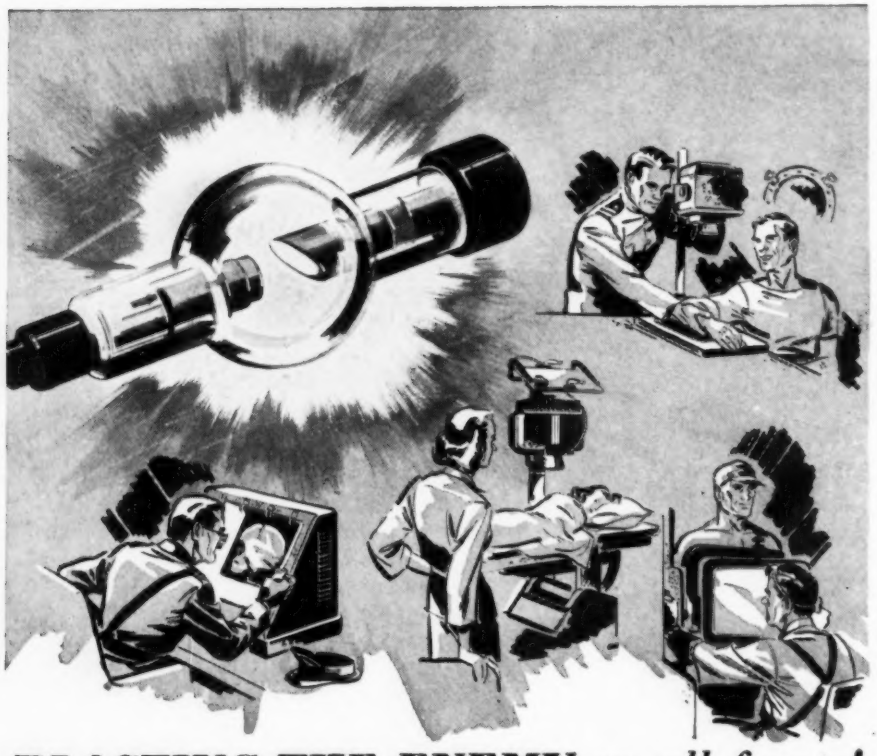

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forerunner to socialistic tendency—and I care not whether the government is monarchy or is republic. If its acts are a constant negation of individualism, it is on the road to communism.

—Dr. R. K. Packard, on "Medical Economics," *Illinois Med. J.*, November, 1942.

To those of us who have been lulled into a position of complacency during the past few years by the frequent assertions of the excellence of our standard of living, it seems rather unnecessary that the United States, like other warring nations, should take active measures to insure good meals for the maintenance of health among industrial workers; but pre-war studies by the U. S. Department of Agriculture showed that diets of families of employed workers in cities were practically always in definite need of improvement." Citing England as an example of a nation which has already sought a solution to the problem, Dr. Goodhart described how Britain, as a result of her experiences in the last war, took strong measures shortly after the outbreak of the present war to insure that the population, and particularly the industrial workers, received adequate amounts of well-prepared foods. He pointed out that it is now law in Great Britain that every war factory employing more than 250 people must provide a canteen where the worker can buy meals, or they must be able to demonstrate to the satisfaction of the Ministry of Labor that feeding facilities in the community are adequate. Quoting from an editorial in the *British Medical Journal*, Dr. Goodhart stated that British experience had proved that "the improvement of the diet of workmen whose diet was not previously up to the standard for health is followed by increased output without any conscious increased effort and also by a reduction in the number of absences.

—Dr. Robert S. Goodhart, at Yale School of Medicine, November 19, 1942.

The control of an industrial health hazard begins with an evaluation of the degree of danger involved. Many times the danger will be self-evident whereas at other times it may be necessary to evaluate a potential hazard by engineering studies. There is a tendency on the part of the management to forget about occupational disease when medical personnel is available, and thus engineering problems related to health inadvertently fall into the hands of the industrial physician. A physician with some knowledge and appreciation of the methods of control can bring to the attention of the engineering and safety personnel a health hazard which could be subjected to some means of control. The coordination of the medical and engineering services of a plant will do much toward furthering a program for control of occupational diseases.

—From "Industrial Health Page," *Minnesota Medicine*, October, 1942.

Explosives makers are warding off occupational illness by compelling employees to take frequent baths. This cuts absorption of poisons through the skin. Experienced manufacturers of explosives, building new plants for the government, have made health precautions a primary consideration. The story is told of one company which flatly refused to go ahead with a project until the War Department gave its approval to costly health precautions. However, there already have been reports of serious cases of poisoning in certain plants handling explosives, plants where the managers were not sufficiently familiar with the insidiously toxic qualities of the chemicals with which they were dealing.

—*New York Wall St. Journal.*

As a result of a meeting in Louisville, October 9, 50 new committees have been appointed in Kentucky to organize subcommittees on industrial health and welfare in the state. More than 100 representatives of labor and management attended the meeting, at which the medical, engineering, safety and welfare offices of a good industrial hygiene program were discussed by prominent industrial hygiene and safety experts. Reporting of occupational diseases is now required by law in Kentucky, 34 of which are included in a list of diseases "declared dangerous."

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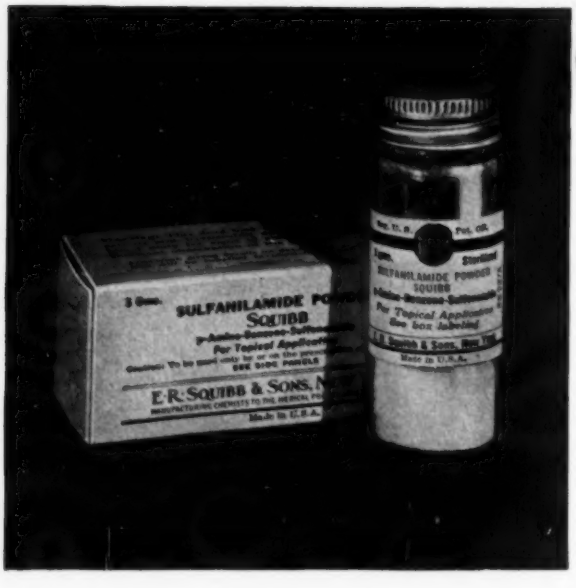

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Industrial Medicine

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The Science, the Law and the Economics of Industrial Health

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Employment of Epileptics

WILLIAM G. LENNOX and STANLEY COBB

AT ALL TIMES, but especially during times of war, the intelligent and effective use of available man and woman power is of major importance. In the last war, epilepsy caused the rejection of 0.515% of the men who came before the draft boards in the United States,[1] and of 0.186% of enlisted men,[2] a total of 0.7%. This percentage, when projected on approximately 50 million persons who are gainfully employed, represents an army of approximately 350,000 epileptics who potentially are productive workers. As we shall see, many of these, possibly one-third or one-fourth, are unemployable. What use is being made, or can be made of the, say, 250,000 persons who are mentally and physically able, but are subject to seizures?

Consider first the armed forces. No epileptic, no matter how able-bodied and intelligent, is accepted for service. In the last war the medical department of the United States Army reported "The patriotism of epileptics was a matter of common remark and they were inclined to conceal their defects."[2] After being accepted more than 6,000 were discharged when their condition was exposed. Rejection is complete and final, and the classification of 4-F, which the draftee receives, serves to prevent his employment in industry. "If the army doctors say his physical condition is hopeless," argues the employer, "I can't use him." The employers and possibly the armed forces fail to realize that a man with a history of seizures who could not be placed on the firing line or in charge of moving machinery might be extremely useful in a score of other positions. Presumably also the government hesitates to employ a person who might become a lifetime pensioner if incapacitated because of his seizures. The blame for this condition rests on legislators who have granted compensation to veterans for disabilities not related to war services. Geneticists criticize the policy of excluding epileptics from the armed services on very different grounds, the folly from the biological point of view of exposing to death only the physically best to the nation's manhood. War enlarges the economic problem of epilepsy because it adds to both the relative and absolute numbers of the affected. Present patients are shielded from war dangers, and from 5 to 15% of the brain-wounded soldiers will become epileptics.

From the Department of Diseases of the Nervous System, Harvard Medical School. Aid was received from the Rockefeller Foundation. This is No. 42 in a series entitled, "Studies in Epilepsy."

The reasons for keeping epileptics out of the armed services are understandable, but should they be barred from industry? In pleading for a greater utilization of handicapped workers, the head of the War Manpower Commission, Paul V. McNutt, declared "Workers must not be rejected for what they lack; they must be hired for what they have."[3] The objections of employers to hiring an epileptic are of two sorts. First, and probably most influential, are current misconceptions about epilepsy. Many persons suppose that epileptics are defective in body, mind, and in personality. Fellow employees have an unreasoning fear of a convulsive seizure and wish to see nothing so unpleasant. This attitude may be changed only by the diffusion of modern knowledge about seizures and by a general hardening of public morale. The horrors of war make a seizure seem unimportant. Employers may rationalize their unwillingness to hire epileptics by suggesting that the stress of hard work is harmful to the person subject to seizures, a conception fostered by misguided medical opinion which overemphasizes the value of a stagnant existence. As a matter of fact, attacks are most likely to occur when the patient is idle or asleep and, in the majority of patients, activity of brain and muscle is an important antagonist of seizures. In England, bombing in the vicinity of institutions for epileptics did not increase the frequency of the patients' seizures.[4] Again, employers, like the general public, are unaware of recent advances in the diagnosis and treatment of persons subject to seizures, and share a general belief that epilepsy is incurable.

A second reason for refusing to employ epileptics is a law which makes the employer liable for injuries which employees may sustain while at work. Recently, the Laymen's League Against Epilepsy asked officials of the various states to explain the standing of epileptic workmen under their compensation laws. Replies were received from 38 states. In only four states does the labor code specifically mention epilepsy. In only nine states does it contain specific statements in regard to the effect of a pre-existing disability on the claim for compensation. However, the correspondents from seven other states expressed opinions, based perhaps on interpretations made in disputed cases. For four states (Minnesota, New Hampshire, Pennsylvania, and Wisconsin) the statement was made that an existing disability did not enter into the question of compensation. The opposite reply (that injury must arise out of and

as a consequence of the employment) was received from 10 states. Answers from the two other states were noncommittal. In five states, decisions affecting employees killed or injured in an epileptic seizure have been handed down by the highest courts. In three cases, Kansas,[5] New York,[6] and Oklahoma,[7] the employer was not found liable, and in two cases, Illinois,[8] and Massachusets,[9] he was found liable. The reasoning of the court can be illustrated by the New York case. An epileptic employee while walking on the sidewalk fell in a convulsion and died from a fractured skull. The industrial board had awarded compensation, a judgment confirmed by the state supreme court but overruled by the court of appeals. This last court ruled that the fall was not due to the employment, it might have happened going to or from work. A fall from a ladder while at work might have been a different story. Two judges dissented, saying that a workman carries with him all his infirmities and the fact that he has them does not destroy his right to compensation. In England a boy riding a bicycle while at work had a seizure and was killed. He rode the bicycle at the behest of his employer but against the advice of his doctor, and the courts held the employer financially responsible.[10]

At first glance decisions which award compensation to the epileptic would seem advantageous to him, but actually they are disadvantageous. An employer will not knowingly hire an epileptic if he (the employer) knows that he is to be held financially responsible for any injury which the epileptic suffers. In most instances the outcome of a hearing or trial depends on the circumstances of the case and on the opinion or bias of the board or court. The uncertainty of the outcome and knowledge that an appeal may cost several thousand dollars, warns the employer to "play safe," and not to play the Good Samaritan. As a consequence of these conditions, a person who has seizures must conceal his disability, which means that neither he nor the employer are able to use safeguards against injury which might be used if the true state of affairs were known. A remedy for this unhappy situation would be a provision whereby the handicapped employee might waive his rights for compensation for injury sustained as a result of his condition. At present, seven states (Connecticut, Indiana, Kansas, Kentucky, Maryland, New Mexico and Wisconsin) permit an employee to reject the compensation code. But even this privilege is not satisfactory. The handicapped person deserves protection against injuries which are the direct result of his employment.

As will be shown, the majority of non-institutional epileptics are employed presumably because they are good workers and their seizures are either hidden or their employers are kind. Dozens of instances come to mind of epileptics who are working effectively for employers fully cognizant of their illness. A more general employment of epileptics would have a therapeutic effect by increasing the patient's morale and self-respect and would be an economic gain to the patient and the nation.

Suitability for Work

THE injustice of the present situation is apparent but has received little attention in the literature except in Europe where sickness insurance is in force. Von der Heydt[11] reported that in Germany epilepsy caused 1% of premature disabilities, the average age of invalidism being 34.6 years against 53.3 for all causes. Two or more seizures a week were judged sufficient for the receipt of benefits. Italian experience has been reviewed by Rizzatti[12] and Chiodi.[13] A list of suitable and unsuitable occupations for epileptics has been drawn up by Steininger[14] and the actual occupations of 78 patients by Ordway and Ryther.[15] Fox[16] found that 54% of mentally normal young patients who had been discharged from special schools were satisfactorily employed.

For additional information concerning the employability and the occupations of epileptics we have examined the medical records of more than 1000 epileptics of working age. Detailed reports of these patients were submitted by neurologists throughout the country who cooperated in the studies and who saw these patients in their private offices or in public clinics. Their names appear in a previous report.[17] This statistical information is supplemental to the authors' own twenty-odd years of specialization in the study and treatment of epilepsy.

PHYSICAL CONDITION: The vital organs of these extra-mural patients are sound as shown by examinations of eyes, ears, hearts, lungs, kidneys, etc., or as sound as any unselected sample of the working population. In respect to posture, general physique, endurance, quickness, etc., epileptics probably average below normal; this is not due to any inherent defect but simply to lack of work or training, or overuse of sedative drugs. Of course, the most serious cases of epilepsy begin in early childhood and, because of death or assignment to an institution, are sifted out of the general population before they become adult.

CONDITIONS OF THE BRAIN: Since epilepsy is a disorder of the brain, the question of damage or dysfunction of this organ is most important. In 78% of 1905 patients of all ages who were carefully questioned and examined, no cause for seizures and no evidence of antecedent damage to the structure of the brain was disclosed. The remaining 22% gave evidence of having suffered some injury of the brain before seizures began. Disabilities of all sorts were more pronounced in this minority group.

The employer is not interested in causes or in the details of examinations of the nervous system, but wants to know whether the prospective employee is capable of effective work. Fortunately, like other vital organs of the body, the brain may perform well in spite of definite damage, and only a fraction of those with evidence of brain injury have physical disabilities which would interfere with their productivity.

The following tabulation shows the proportion of the patients (about 1500 of all ages) who exhibited certain physical disabilities.

Muscular strength—strength reduced	8.2%
—paralysis of muscles	0.6%
Coordination impaired	7.2%
Involuntary muscle movements (exclusive of fits)	4.6%

The disabilities listed occurred several times more frequently among persons who had received brain injuries than in the total group. For the most part, the various disabilities occurred in the same persons. We may conclude, therefore, that about nine-tenths of epileptics in the community have normal muscular strength and control.

Even more important than the muscles is the mind. The association of mental deterioration and epilepsy has been grossly overestimated by doctors as well as by the public. Among 838 epileptics, 20 years of age and over, 67% were judged by the examining neurologist to be mentally normal, and in only 9.2% was gross deterioration observed. If those who had received brain injury are excluded, 70% of patients were found to be normal. Severe impairment of neuromuscular control and of mentality most often appear together. In the majority group of mentally normal, patients' intelligence quotients are widely scattered, in our experience reaching from 100 to as high as 154.

Not only have mental defects and epilepsy been falsely associated in the popular mind, but some doctors have suggested that epileptics possess a peculiar and unpleasant personality—self-centered, one-track minds, with short-lived interest in their work. These strictures apply to a very small proportion of patients, for the most part to those who are mentally defective.

In conclusion, a certain proportion of adult epileptics, because of brain injury which has caused paralysis or because of mental deterioration, abnormalities of personality, or the frequency or severity of seizures, are not fit for employment. This proportion is small, probably no more than a third or quarter of patients in the community. Among those who are able to work, qualities of willingness, faithfulness, and eagerness to prove acceptable are unusually high.

More important than this survey of potentialities is the actual employment record of adult patients.

Occupational Experience of Patients

THE examination blank asked about the ability of the patient to work. The following tabulation gives the answers from 608 men and 497 women, 18 years of age or over, comprising respectively 84 and 82% of those questioned.

PERCENTAGE OF PATIENTS ABLE TO WORK

	Men	Women	All Patients
Fully able to work.....	54	48	51
Partially able to work.....	24	34	28
Unable, because of seizures..	19	15	18
Unable, for other reasons....	3	3	3
Total	100	100	100

Thus only 21% were listed as unable to work. In this group, epilepsy was the deterring condition in 86% of the men and 83% of the women.

OCCUPATION RECORD: The following data refer to 571 men and 370 women 18 years and over, who answered the question about past and present occupation. Information from another 7% was not obtained.

PERCENTAGE OF PATIENTS OCCUPIED

	Men	Women	Both Sexes
Formerly occupied	97	92	95
Occupied at present.....	73	73	73

Of men and women who worked formerly, 98% are now fully able, 92% are partially able, and 90% are unable to work. Of men and women who are occupied now, 88% are now fully able, 74% are partially able, and 34% are unable to work.

Naturally, the proportion of the employed falls sharply with the working ability of the patient. Thirty per cent of the men and 42% of the women now occupied were classed as unable to work. Probably these persons were for the most part students and housewives. These persons were included among the occupied because, for the epileptic, the fact of being busy is of more importance than financial return.

On the whole the employment record of these patients is encouraging, especially in view of the fact that all the persons were seeking medical advice. However, we know that the positions of many of those employed are at the mercy of a chance seizure "on the job." This uncertainty, and the necessity for concealment make for impaired efficiency of work.

TABLE I.
OCCUPATIONS, PAST AND PRESENT, OF PATIENTS 15 YEARS AND OVER

	Former Occupations			Present Occupations		
	Men	Women	Both Sexes	Men	Women	Both Sexes
Number Reporting	581	387	968	563	416	979
	%	%	%	%	%	%
Professional and Arts	8	7	7	12	6	9
Business	22	14	18	28	9	20
Skilled Work	15	5	12	14	2	9
Unskilled-domestic Work	26	36	30	27	62	42
Student	29	38	33	19	21	20
Total	100	100	100	100	100	100

Occupations

THE principal occupation, past and present, of each person was listed. The summarized results appear in Table I. A larger proportion of men than of women are in business or in skilled work, a larger proportion of women are students or doing unskilled work, which category includes housework and housewives.

In comparing former and present occupations, the decrease of students matches the increase in the proportion of men in the professions and in business. Among the women the principal losses are in teachers, telephone operators, salesgirls, factory and restaurant workers, a total decrease from 65 to 23, and in the number of housewives from 68 to 17. The question of whether being a wife and mother is a proper occupation for epileptics lies outside the scope of this study. These summarized data do not indicate any regression in the quality of present occupations compared with those formerly followed. This inquiry did not include information as to whether the former occupations preceded or followed the onset of the person's epilepsy.

Omitting students and housewives, 359 men and 157 women at the time of examination were gainfully employed. Among the men, 10, or 2.8%, are physicians; clergymen, dentists, engineers, lawyers, teachers and physicians constitute 14% of the whole group. Among women, ministers, nurses, physicians and teachers make up 12%. Among men, occupations most frequently named are: salesman, 14%, farmer 13%, clerk 10%, laborer 10%, and mechanic 6%. That 4% of male patients are chauffeurs occasions both surprise and disapproval. Among women most frequent occupations are: stenographers 9%, clerk 12%, and housewife 46%.

The following present occupations of 359 men are grouped with reference to the number of persons reporting. Obviously some of the classifications overlap:

One to four reporting—chiropractor, dentist, veterinary, collector, newspaper work, shipper, butcher, cook, draftsman, jeweler, locksmith, fireman, hotel worker, laundry, messenger, seaman, dancer, musician, stage, writer, cowboy, professional sports, welfare.

Five to nine reporting—clergymen, teacher, banker, barber, clothing, grocery, insurance, electrician, medical technician, metal worker, plumber, railroad worker, carpenter, painter.

Ten to 19 reporting—physician, mechanic, factory worker. Thirty or more reporting—salesmen, farmer, laborer.

Following are the occupations of 157 women: One to four reporting—clergy, librarian, physician, psychologist, interior decorator, newspaper, real estate, salesgirl, store manager, beautician, billing machine operator, jewel setter, laboratory technician, printing, telephone operator, restaurant worker, actress, musician, painter.

Five to nine reporting—nurse, teacher, dressmaker, factory worker.

Ten to 19 reporting—clerk, stenographer. Housework tops the list with 73 reporting.

SUITABLE OCCUPATIONS: Since these data were col-

lected, the outlook for successful medical treatment has been greatly improved because of the discovery of a more effective anticonvulsant drug, dilantin (or phenytoin) sodium. Looking at the problem from the viewpoint of the physician, jobs not suitable for epileptics may be placed in three classes.

First are occupations categorically forbidden because the lives of others might be endangered. These include the operation of fast moving vehicles, airplanes, automobiles, locomotives, elevators, street cars, or buses; positions of intense personal responsibility, major surgery, private duty nursing, trapeze performer, solitary watchman or lookout, swimming instructor, etc.

Second is the operation of machinery of such a nature or work at such a height that temporary loss of consciousness might injure the patient or the machine; these occupations include house painting, bricklaying, carpentry, bridge building, steeple-jacking, mining, welding, machine tool operation, etc. The use of safety appliances may, in some cases, mitigate the danger. For example, one of our patients works at a height, painting towers. He contends that he is relatively safe in this position because an attack at work leaves him hanging in his safety belts, whereas one in the street might leave him in the path of an automobile.

Third are prohibitions which arise from popular reactions and prejudices. In this group, a controlling factor is the number of eyes focused on the person. The stage, the concert platform, or the pulpit is a more vulnerable position than a desk or counter. Nevertheless, we have had as patients, ministers, college professors, public school teachers, legislators, and bankers. Positions which entail contact with the public are not inherently unsuitable, but their retention depends on the tolerance and intelligence of that particular segment of the public which may be onlookers, and on the popularity of the patient. When persons who make up the public learn that, fundamentally, epileptics are no different from themselves, and that a seizure is nothing to be ashamed or afraid of, the positions open to epileptics will be greatly enlarged.

A person cannot be advised flatly against entering occupations in the third group because treatment may prove to be successful, or public sentiment may be changed. In all cases, advice must be fitted to the individual. Considerations which have weight for healthy persons (personal preferences and aptitudes, previous education and training, personality and financial resources) must in the epileptic be supplemented by considerations as to the number, frequency and types of seizures and the probability of successful medical treatment.

Having specified employments barred to epileptics or not suitable for them, the more extensive list of employments is, or should be, open to them, either freely or with certain stipulations or safeguards.

In addition to those patients, happily in the majority, who are capable of doing full work at regular wages, is a small minority of persons who are seriously handicapped or without special training. The Auracraft Shop in Cleveland, conducted by Dr. Joseph L. Fetterman,[19] and the Goodwill Industries, of Chicago, demonstrate the feasibility of workshops for epileptics who cannot find regular employment. Pay for such work is below standard rates but the medical and psychological help which patients receive is more valuable than money.

Public Responsibility

For the people to support in idleness thousands of able-bodied and able-minded persons simply because they are unable to work for a few hours or days out of a year is extravagant folly. Between convulsive episodes which are weeks, months, or in some cases years apart, most epileptics are as normal as their brothers or sisters and perhaps even better able to do an honest day's work. In the United States, the average worker loses 10 days a year because of accident or illness. The majority of epileptics are incapacitated by their disorder fewer days than this. For example, one of our secretaries has had approximately 100,000 petit mal, a near record as regards numbers. In the aggregate they represent approximately two weeks of unconsciousness. This time loss is much less serious than that occasioned by her colds.

An altered public opinion should bring about changes of labor laws which would permit a patient to work at his own risk, so far as injuries directly due to seizures are concerned and at a lower wage if his productivity is impaired. The employer should know the person's history in order to cooperate in measures which would lessen the danger of accident. As affairs now stand, the prospective employee must conceal or lie about his sickness else he would never be hired. Cooperation should include the doctor. The employer can employ a man or woman with more confidence if he knows that this person is under competent medical care. The Laymen's League Against Epilepsy is organized for the purpose among other things of a more effective employment of this reservoir of man power.

Summary

Adult epileptics in the United States, when projected on the number of persons who are gainfully employed, form an army of some 350,000 men and women. The men are unreservedly excluded from the armed forces and with the irretrievably poor 4-F rating find it difficult to enter industry, labor hungry though it is. As a rule, employers will not knowingly employ an epileptic of either sex because of the prevailing ignorance about epilepsy and because of possible liability in case of accident. A review of the laws of various states with regard to compensation demonstrates the need for provisions whereby the epileptic may work at his own risk in the event that injury is the result of a seizure.

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THE pictures are from Dr. Fetterman's Auracraft Shop in Cleveland. In the article above referred to (Ref. 19) Dr. Fetterman says: "During the past 18 months, over 150 epileptics from our community have made inquiry or applied for admission to this program. Over 50 have been given temporary or more or less permanent employment. Thus far, 15 are quite steadily employed, but on several occasions as many as 25 have been kept busy. There have been relatively few attacks during work, an experience that bears out the remark of J. T. Fox (in *J. Mental Sc.*, September, 1939): 'It is a commonplace observation that want of occupation and unhappiness increase the incidence of fits.' . . . . The aim of the Auracraft Shop is to provide work and training as a supplement to but not as a substitute for medical care. Any epileptic referred by a physician or a clinic is eligible. Preference is given on the basis of eagerness to work and the need of the home. A nurse and rest room are available for any who has an attack. But, for the most part, epileptics have been grouped in pairs and instructed to look after each other. . . . The value of the shop may be thus summarized: The epileptic himself has acquired a new interest and regained a feeling of usefulness. He has had a chance to mingle, and the tragedy of his fate has been lessened when he has met fellow epileptics. The shop has given him training and he has developed confidence in his ability to work. The increased confidence acquired through the training and experience of our shop spurred many to secure employment in private industry. Some have succeeded in holding their jobs. Those who have been discharged returned to Auracraft, disappointed, but not entirely defeated. Along with these educational and psychologic benefits of the shop, each epileptic has received some monetary return."

Methyl Bromide

— Local and Mild Systemic Toxic Effects —

R. M. WATROUS, M.D.,
Plant Physician, Abbott Laboratories

SEVERE systemic poisoning by methyl bromide has been reported a number of times since that substance came into general use as a refrigerant and insecticide. The literature is well reviewed by Dudley, Miller, Neal and Sayers,[1] but no mention is made in their paper of local toxic effects on the skin. The mild systemic effects which may follow exposure to very small concentrations of the vapor for periods of several hours have not often been described.

An opportunity to observe both of these phenomena recently presented itself during the preparation of a large number of sealed glass ampoules, each containing a small dose of methyl bromide. This manufacturing operation involved the dispensing of liquid methyl bromide into open ampoules, which then had to be sealed with heat, tested for leaks, and packaged. Contact of the skin with spilled liquid and slight contamination of the air, which occurred despite extensive precautions, caused characteristic skin lesions resembling second-degree burns and a variety of systemic symptoms of a distressing but transient nature.

The Manufacturing Operation

THE methyl bromide was delivered in metal tanks resembling those used for acetylene. It was piped to the dispensing spigot through a copper coil immersed in a bath of acetone and solid CO_2. This preliminary cooling was intended to reduce the vapor-pressure of the liquid, thus minimizing evaporation loss and contamination of the air. The spigot consisted of a metal stop-cock to which was soldered a fine copper tube small enough to enter the necks of the ampoules. During operation, the whole apparatus became coated with frost; this necessitated frequent wiping of the fine copper dispensing tube and a long insulated handle on the stop-cock to prevent frostbite. After a shut-down, or immediately following the installation of a fresh tank of methyl bromide, small pockets of vapor were often present in the system, and until these had been purged the flow of liquid tended to be irregular, with a certain amount of splashing.

During the first manufacturing period, which lasted a week, the ampoules were held in the bare left hand of the "filler," and the stop-cock was operated by the right hand. The right elbow rested on a sponge-rubber pad. During a second period, a wire test-tube clamp held the ampoules, and the rubber pad was eliminated.

After filling the ampoules, the filler placed them in a metal rack which was partly submerged in a pan containing acetone and solid CO_2. From here, they were taken by the "passer," who inserted them into small metal cups lined with insulating material, and placed these within easy reach of the "sealer." The sealer fused the neck of each ampoule in a gas-oxygen flame, handling only the outside of the metal cup, and then placed the ampoule in a box convenient to the "inspector." The inspector removed each ampoule from its cup with bare hands, inverted it to test for leaks, and then placed it in a large cardboard box. Imperfect ampoules were placed in a separate box, which was removed at frequent intervals to a separate hood for recovery of the methyl bromide.

The recovery operation required breaking the neck of the imperfect ampoules after re-chilling them, and pouring the liquid into new ampoules through a funnel. During the first week, this was done with bare hands and a pair of pliers, but later test-tube clamps were employed to hold the ampoules.

The boxes containing the sealed ampoules were removed to another room, where a further test for leaks was carried out, and were then delivered to the packaging room. Here, the ampoules were inspected, and each placed in a cloth bag. The bags were fastened securely at the open end and placed in individual cardboard boxes, which were then packed in larger containers for shipment. Since the ampoules were at room temperature during this operation, their internal pressure caused some of them to explode. The contents vaporized almost immediately and diffused into the general room air, while flying fragments of glass presented a mechanical hazard. However, only one minor injury from this cause occurred.

Engineering Safeguards

BECAUSE the toxicity of methyl bromide vapor was known, special arrangements were made to safeguard against it. Filling, sealing and inspecting were carried out in four long hoods each divided by partitions into three compartments. Each compartment was exhausted through two openings on either side of the back wall at its junction with the hood floor. These openings communicated with a common duct running to a blower which exhausted the air to the roof. During the first manufacturing period and part of the second, this blower was found to be exhausting 1400 cubic feet per minute. Later, when it seemed advisable to procure better ventilation, a larger blower was installed which exhausted 2700 cubic feet per minute. Measurements made at the operators' breathing levels at the various work positions showed linear air velocities of 100, 61 and 39 feet per minute for the filling, sealing and inspecting operations respectively.* As will be seen later, this amount of air movement was not sufficient to eliminate mild toxic symptoms.

To provide a check on the functioning of the hoods, and to detect any leaks which might be present in tank connections, frequent use was made of the "Frigidaire leak detector," a small blow-torch using methyl alcohol for fuel and equipped with a copper combustion tube into which air is drawn through a tubular duct. The presence of any halide in the air causes the almost colorless flame to assume various shades of green or blue, roughly proportional in intensity to the vapor concentration.[2] Dudley, et al.,[1] state that the extreme lower limit of sensitivity of this apparatus is 35 parts per million of methyl bromide under ideal conditions, and that its use may lead to a false sense of security, since less than 35 parts per million may be toxic on prolonged exposure. In practice, it was found convenient to distinguish five degrees of color in the flame, which was adjusted to extend approximately two inches beyond the nozzle of the torch. These were coded as follows:

0 : No trace of green color to flame viewed against dark background.
1 : Slight trace of green at base of flame.
2 : Faint green extending the entire length of flame, on outside.
3 : Solid light green flame.
4 : Solid brilliant green to blue flame.

During the first manufacturing period, this torch was used to detect gross leaks and to test the general room air, but the measurements were not recorded. During the second period, hourly tests were made at the breathing level of each operator and at various other spots in the room. The results of these tests are given in Table 1.

The experience of the first manufacturing period indicated that certain additional devices were necessary to secure better removal of vapor from spilled methyl bromide. The main spillage occurred in the filling operation after the ampoule had been removed from the spigot. At this time, several drops of methyl bromide almost invariably fell to the floor of the hood. At first, these had been caught in a petrie dish placed just beneath the filling-tube, but later this dish was replaced by a metal funnel connected to a piece of one-inch pipe which extended to the rear of the hood and projected into one of the ventilating holes. In this way, a strong local suction was established at the point where the spillage occurred, and a marked lessening of the contamination of the air at the filler's position was noted.

On two occasions, temporary heavy contamination of the air occurred: once, the bottom of a box of sealed ampoules fell out, and a number of them broke on the floor; on another occasion, stripped threads on a pipe union gave way, and methyl bromide sprayed into the room until the tank could be shut off. On both occasions, operators were evacuated from the room until the foreman, equipped with a gas mask, had completed repairs and had obtained a negative test with the methanol torch.

All operators were required to wear plastic face shield goggles to protect the eyes from the double

Typical methyl bromide blister, left thumb

*These measurements, and those of the concentration of methyl bromide vapor in the air, were furnished by Mr. Douglas Loper, engineering assistant to the department.

hazard of spattered methyl bromide and flying glass fragments.

No special exhaust ventilation was installed in the packaging room because it was extremely large and the work occupied only a small fraction of the floor space. Electric fans were placed so as to dissipate rapidly and thoroughly any vapor which might be liberated by broken or leaking ampoules. This lack of special ventilation was justified by the small number of operators reporting symptoms after engaging in packaging work and by the complete absence of symptoms among many other employees working in the same room.

Local Effects

WHEN liquid methyl bromide was spilled on the skin it appeared to evaporate almost instantaneously, producing a cool, but not a cold or burning sensation. Small quantities could come in contact with the skin in this way several times without producing any damage, but the repeated application of small quantities, or a single application of larger amounts, gave rise to a characteristic chain of symptoms. The first sensation noted was burning or tingling of the skin shortly after exposure. In the more severe cases, this was followed by a sense of numbness, and later by an aching pain. The skin in the early stages appeared red and slightly swollen. After two to 12 hours in the severe cases vesicles or blebs appeared on the exposed surface. These resembled second-degree burns, and their size was roughly proportional to the severity of the exposure. These blisters were markedly distended with a clear straw-colored fluid, but showed little tendency to become re-filled after being emptied by aspiration. In cases where exposure was not severe enough to produce vesicles, there frequently appeared a fine, papular or vesicular, itching dermatitis after a latent period of seven or more days. A similar eruption was often seen as a late complication of healed blisters in the severe cases, sometimes appearing on the healed base of the blister, and sometimes involving the less severely exposed skin at the periphery of the blister. These lesions most closely resembled herpes, having a tendency to be grouped, and causing severe itching and burning sensations. They often occurred around the folds at the base of fingernails, or on the sides of the fingers. They occasionally became vesicular, but never pustular or crusted.

If treated by aspiration of the fluid and bulky cod liver oil ointment dressings, the vesicles healed in about one week without infection or pain. One case, treated on the outside, developed infection of the whole blistered area after the top of the bleb had been removed.

The most troublesome feature of the dermatitis was the intense itching, but all cases subsided within five to seven days under conservative treatment with calamine lotion. The only exception was a patient who consulted an irregular practitioner on the outside, and was treated with an ointment containing a topical anesthetic. This patient had a known cutaneous hypersensitivity to procaine, and immediately developed a spreading allergic dermatitis which rapidly involved the arm, shoulder, neck and right thigh. It was not possible to determine whether this resulted from methyl bromide or the ointment, but fortunately the condition subsided rapidly following x-ray treatment and aluminum subacetate wet dressings, prescribed by a consultant dermatologist.

In most cases, as the blisters and dermatitis healed, there was considerable desquamation of the skin, resembling that seen after sunburn. The underlying integument soon assumed a normal appearance, but seemed to be temporarily more sensitive to renewed contact with methyl bromide than before.

In all, there were 22 cases showing skin lesions. Four of these had blisters which healed without dermatitis, 11 had both blisters and dermatitis, and seven had dermatitis only. Seventeen of these patients also complained of systemic symptoms.

The location of some skin lesions furnished several clues as to the manner in which methyl bromide damages the skin and aided in determining the best manner of handling this substance so that further lesions might be prevented. It soon became apparent that the damage was not of thermal origin, as had first been supposed, because invariably those regions from which evaporation would have been most rapid—and which, consequently, should have been the most chilled—were less severely involved than regions from which evaporation would have been slowest. Skin in the folds between fingers and areas covered by bandages or adhesive tape were always more severely affected. This led to the conclusion that methyl bromide, though it appears to evaporate completely in a few seconds, must actually dissolve to a small extent in the skin and then produce damage of a chemical nature. Any influence retarding evaporation would, of course, favor absorption by prolonging the time of contact.

By similar reasoning, it was concluded that methyl bromide must dissolve rather rapidly in rubber and adhesive tape. Severe blisters occurred on several operators who rested their elbows on sponge rubber pads, but the location of these pads was such that only occasional drops of liquid methyl bromide could spatter on them, and they never appeared to be moist or cold. Similarly, the skin beneath adhesive tape which had been contamined by methyl bromide showed intense reaction, while surrounding skin remained relatively unaffected. For these reasons, no attempt was made to "protect" the hands of workers with gloves of any type—especially rubber gloves—and no operator was permitted to work with dressings or adhesive tape on the hands. In two instances where methyl bromide had spilled in considerable quantity on the feet, it was considered advisable to forbid the wearing of those particular shoes and stockings for 24 hours, though the extent to which cotton and leather would retain the chemical was unknown. It was observed, however, that the occasional spattering of a few drops of methyl bromide on the front of cotton uniforms in the filling operation did not lead to any lesions on the underlying skin.

Systemic Reactions

OUT of 90 persons who worked in the filling and sealing room, 31 developed systemic symptoms at some time during the two-week exposure. By far the commonest complaint was anorexia or nausea, and this was found in all degrees, leading to vomiting in the more severe cases. Two patients complained of anorexia only, and 23 complained of nausea. In 10 cases, these symptoms progressed to vomiting. The onset was variable as to time after exposure, sometimes occurring at work after a few hours' exposure, and sometimes being delayed until several hours after the patient had completed the shift. Anorexia tended to be constant and remarkably persistent, often lasting for a week or more after exposure had ceased. Several patients who had experienced attacks of vomiting expressed an aversion to solid food for some time afterward, but were able to eat and relish liquid nourishment. Despite the frequent complaints of anorexia, no marked loss of weight was remarked in any of the patients on inspection.

The other symptom most commonly complained of

TABLE I.

Day	1							2																								3												
Hour	1030	1130	1230	1330	1530	1810	2130	0000	0100	0120	0200	0300	0400	0500	0600	0700	0800	0930	1130	1220	1400	1500	1630	1800	2000	2130	2330	0015	0100	0140	0200	0300	0400	0500	0540	0845	1045	
Filler 1	0	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4	0	4	0	0	0	
Passer 1	0	0	0	0	0	0	0			Not				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	
Sealer 1	0	0	0	0	0	0	0			in				0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	
Insp. 1	0	1	0	0	0	0	0			Use				0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	2	0	0	0	
Tank 1	2–3	2	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0		0	0	0	0	0	0	0	
Filler 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Not in use	0	0	0	0	0	0	0	1	0	0	1	0	2	0	0					0	0	0	
Passer 2	0	0	0	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Not			0	0	0	
Sealer 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	3		in			0	0	0	
Insp. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		Use			0	0	0	
Tank 2	2	1	1	1	1	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	1	1	1	4	0	0	0	0	0	0	0	0	0	0	
Filler 3	0	0	0	0	0	0	0	0	0	0	0	0	0	Not in use	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	0	3	0	0	
Passer 3	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	0	1	0	0	
Sealer 3	0	0	0	0	0	0	0	0	0	0	0	0	3		0	0	0	0	0	0	1	0	0	0	0	0		0	0		0	0	0	0	0	0	0	
Insp. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	Not in use	0	0	0	0	0	0	0	0	0	1	0	0		0	0		3	0	0	2	2	0	0	
Tank 3	2	1	0	2	0	2	0	2	2	1	2	0	0	0	0	0	1	0	0	0	0	1	0	0	2	0	0	0	0		0	0	0	0	0	0	0	
Filler 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	1	3	0	0	
Passer 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	1	0	0	0	
Sealer 4	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0		0	0		0	0	0	1	0	0	0	
Insp. 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	2	2	0	0	
Tank 4	1	0	0	1	0	0	0	0	0	0	0	0	3	2	0	0	0	1	0	1	1	0	1	0	0	0	3	0	0		0	0	0	0	0	0	0	
Recovery	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	Fumes Detected by Sealer	0	0	0	0	0	0	0	Shut down. New Blower Installed.
Room air	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	
Floor	0	2–3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0		0	0	0	1	0	1	0	

Flame readings at breathing levels of operators, around tank connections, in general room air, and on floor, second manufacturing period. Hours

was headache, which was present in 16 cases. This was generally not severe, and was often elicited only by specific questioning. In general, the headaches were present only during the time of exposure, and disappeared promptly when exposure ceased.

In addition to these common symptoms, there were two other groups of complaints which occurred in only a few instances. One group, because it accompanied other symptoms obviously caused by methyl bromide, was attributed to the action of this substance. The other, occurring many days after exposure had ceased, was more difficult to classify.

Vertigo, occurring in four cases, and faintness in two, were undoubtedly caused by methyl bromide, since they accompanied other signs of acute mild illness, immediately following known exposure. Four persons complained of a peculiar sensation in the eyes, variously described as "eyes feel tired," "feels like I can't focus my eyes on the work," "can't accommodate rapidly for near and distant objects." Close questioning failed to elicit any identification of this symptom with actual diplopia or nystagmus, though it was felt that mild dysfunction of the extraocular muscles would best account for the sensation described. Three other patients stated they noted abnormal sleepiness: two of these felt "dopey" or "sleepy" for a few days following exposure; the third stated she slept 24 hours without awakening following a period of exposure which had produced other symptoms. Two patients complained of dimming of vision, and in one of these amaurosis occurred for a period of 12 hours following severe nausea and vomiting. This patient was seen on the following day, however, and was then able to read newsprint in a subdued light. The condition has not recurred at the end of six weeks.

Three patients developed a constant, moderately severe epigastric or substernal pain, with "gas" and eructations, about 10 days after the exposure had ceased. One of these displayed the typical symptoms of pyelitis a few days later, but in the other two, no cause could be found for the symptoms, which subsided in a few days. Two other patients known to have been exposed to methyl bromide developed severe muscular pain in the quadriceps muscles of both legs, made worse by exertion. This symptom appeared about 10 days after exposure had ceased, but could not be traced to any common cause, such as unusual exercise or muscular strain. It is highly problematical whether such manifestations are attributable to methyl bromide.

Comments

THE systemic symptoms described are, in general, milder than those which have previously been noted in the literature. This is explainable by the small magnitude of the exposure, as shown in Table 1. Indeed, the concentration of vapor to which these operators were exposed for the greater part of the time was well below that considered "safe" in the older literature. The number and variety of symptoms which arose, despite the engineering safeguards which were present, should emphasize the potential toxicity of this gas.

The local effects of methyl bromide are rather surprising when one considers the freedom with which ethyl chloride may be sprayed on the skin. Ethyl bromide has been handled in this plant for many years without producing any skin irritation, even when spilled in large amounts. However, benzyl chloride is well known to our chemical workers as a powerful vesicant agent, and extreme caution is required in handling it. The diverse action of these four alkyl halides on the skin does not seem to support the view that they exert their toxic action after undergoing hydrolysis, for surely the HCl liberated from ethyl chloride should be just as irritating as that liberated from benzyl chloride, and the HBr from ethyl bromide should be just as toxic as that from methyl bromide.

Summary

A MANUFACTURING operation is described in which 90 persons were exposed to concentrations of methyl bromide vapor generally less than 35 ppm., and the resulting mild systemic symptoms in 33 of them are described.

TABLE I.

4				5															6											7	Day
1330	1600	1800	2000	0000	0100	0200	0300	0400	0420	0445	0600	0700	0330	0345	1145	1430	1700	1900	2100	0050	0300	0540	0620	0845	1030	1200	1345	1505	1700	1900	2100	2300	0100	Hour
0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Filler 1
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Passer 1
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Sealer 1
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Insp. 1
0	1	1	1	2	0	0	1	0	3	0	0	0	0	0	1	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Tank 1
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Filler 2
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Passer 2
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0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Room air
0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	Floor

written 0000 to 2400 (midnight to midnight). Flame colors 0 to 4 (see text for explanation).

2. A characteristic vesicular "burn" and a late itching dermatitis caused by contact of methyl bromide with the skin are described as they affected 22 persons.

3. The skin lesions are due to a specific toxic effect of locally absorbed methyl bromide, and not to a thermal effect.

4. Certain types of organic matter, specifically rubber and adhesive tape, may absorb and retain methyl bromide for some time, and contact with such contaminated objects may produce skin lesions.

5. The commonest systemic symptoms are anorexia, nausea and headache, but a variety of other symptoms of C.N.S. origin occurred in a few cases.

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Physical Examinations

— Entrance and Return-to-Service —

GEORGE P. MYERS, MD.,
Medical Director, New York Central System, Chicago

WE ARE very lenient in return-to-service examinations and accept any employee for return to service provided his physical condition is such that it does not interfere with the efficient and safe performance of his duty.

One thing about which many seem to be confused is hernia. Hernia, of course, is a cause for the rejection of an employee entering service, but on return to service it is not a cause for rejection, our only requirement being that the employee must wear a suitable truss. Not infrequently it happens that some of you examine an employee returning to service and reject him because he has hernia.

As a matter of fact we would much rather see these employees have their hernias operated, but we felt it was a little out of our province to try to require it.

As you know, we have been taking into the service many new employees. This paper applies mostly to employees entering the operating department. These are the employees we are most interested in, so far as their physical requirements go. I would like very briefly to consider with you the standards of physical fitness of these men, especially those entering train and engine service. The times are especially trying for us in selecting them. The government has taken or will take into the Army a large quota of the young men who are physically fit. The many factories engaged in war production are offering very lucrative work; probably their physical standards are not so exacting.

The men who are chosen for the operating department are entering hazardous employment, where a first-class physique and mental alertness are just as important as they are in the Army. From them will later be chosen the supervisory officers and the higher officials who will one day run the railroad. We should endeavor to maintain the highest possible standards in accepting these new employees. In the past five years in our office we have seen too many employees go to pieces in the fifth and sixth decades of life. They are valuable employees. It has cost time and money to develop them. They have attained an age when they should be at the very peak of their usefulness, when they should be in line to advance to positions of greater responsibility. When we examine young men for entrance to service in the operating department we should endeavor to look 20 or 25 years into the future. If, young as he may be, a man has a blood pressure of 140/100, or a murmur in the heart which we are pleased to call functional, or a little albumin in the urine, what will this develop into when he is 45 or 50? Right now he may be vigorous and healthy in appearance, and no doubt he is well qualified physically to perform the duties required of him. We do not maintain that careful selection will eliminate all of those who later develop degenerative diseases early in

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life and have their careers materially shortened. But we do maintain that we can eliminate a very considerable percentage of them.

More attention should be given to mental attainments in these young applicants. Are they alert and intelligent? Do they quickly and intelligently respond to your requests during examination? It is our personal custom to inquire how far they have gone in school. Education by no means guarantees that an applicant will make a better fireman or engineer. But the fact that an applicant has been sufficiently interested in an education to finish high school will generally indicate a more desirable type of employee than the one who has quit school after finishing the eighth grade.

Within the year you have each received a mimeographed circular detailing the causes for rejection of applicants. It is hoped you have read the list carefully and will always keep the defects in mind when examining applicants. Do not forget that these examinations should be made with the applicant "stripped of clothing." By following this rule a better examination can be made in less time. Deformities and orthopedic abnormalities stand out glaringly on casual inspection. You would be surprised how often it develops that an employee had some abnormality when he entered the service and it was overlooked in the medical examination. There is no possible excuse for this. If these men are examined, stripped, turn them towards you and away from you, and those deformities stand right out. You can't miss them. Let us review briefly some of the defects which might be considered borderline.

"Marked pyorrhea, focal abscesses and markedly diseased teeth" are named causes for rejection, and properly so. You may find cases where you will have some hesitation in deciding whether they come within the above classification. In such cases sum up the general personal appearance and cleanliness and mental reactions. If they are all unfavorable the man should be rejected. Where the mouth shows total neglect the applicant should be promptly rejected, regardless of evidence of deleterious effects on the general physical condition. Such neglect is an evidence of something in his character that would make him undesirable in train and engine service. Conversely an alert, intelligent healthy young man will have a clean mouth. Some of you have required the applicants to have their mouths put in satisfactory condition before you approve them for employment. We approve of this policy. All who are approved with dental caries are accepted provisionally with the understanding that the dental condition will be corrected within 60 days. We have been quite successful in our efforts in this direction, although it usually requires longer than 60 days to accomplish the desired result. Each case is followed until a dentist's report is received showing the teeth in good condition. It is much easier to have these teeth taken care of *before* they enter the service. They are anxious to get in.

We have found if they are told to do so they go out and have their mouths fixed up and come back within a few days ready to enter service.

Applicants who at the time of examination show evidence of either glycosuria or albuminuria are consistently rejected. This is the only safe course. If you have approved the applicant we may ask that he be referred back for a second examination of the urine. If it appears reasonably sure that the finding at the original examination was transitory and the applicant is otherwise in first class condition, he is accepted. In the case of glycosuria not only subsequent negative urinalyses are required but also a normal fasting blood sugar.

Abnormal blood pressure is a cause for rejection. It is difficult if not impossible to put this defect into concrete figures. We all know that under excitement the blood pressure may rise and the pulse rate increase. A systolic pressure not over 150 mm. has been somewhat arbitrarily accepted provided the diastolic pressure remains below 90. In all cases applicants with a diastolic pressure of 100 mm. or over have been rejected regardless of the systolic pressure. Little attention has been paid to the pulse rate unless it rises to 110 or over. In such cases the applicant should be given an opportunity to calm down. If the pulse remains 110 or over he should be rejected.

Many reports are received where an applicant who has a heart murmur has been approved. All cases with a heart murmur should be rejected. It may be that you have been in the habit of diagnosing as functional, apical murmurs not transmitted and not accompanied by hypertrophy. Even the experts make mistakes in estimating the importance of such murmurs, and for our purposes they should all be considered organic.

Chronic otitis media is a condition sometimes overlooked and sometimes noted although the applicant is approved. This disease is always a cause for rejection and very properly so, even with normal hearing. Do not neglect to look into the ears before you answer the question as to whether there is any discharge.

We have had a number of cases that have caused us trouble where young men with chronic otitis media have been accepted. We had one embarrassing case. A young man was examined by one of our surgeons and rejected because of chronic otitis media. He was smart enough a few weeks later to make an application a few miles away. He was examined by another doctor and passed. The applicant's papers were received in our office and, as we always do, we made a search in the file to see if we had any record of the young man. Apparently his previous examination was overlooked and a few weeks after we accepted him we had a letter from the management stating that they failed to understand why he was rejected in the first instance and accepted a few weeks later. That young man is still working for the railroad. We don't like those things. He worked too long for us to reject him, so he is there with his chronic otitis media.

Please do not overlook the instructions under the paragraph headed "General," which is quoted in full: "When an applicant for employment has none of the disqualifying defects mentioned above but whose general condition (mental and physical) is sub-standard from any cause and whose efficiency is thereby impaired, he should be rejected. In all doubtful cases the company should be given the benefit by the examiner, or if he desires the matter may be referred to the Medical Director." Among other things, variations from normal weight not mentioned as a cause for rejection, should be considered under this heading, especially marked overweight. Obesity is a serious handicap in operating employees. As such men become older and fatter they are peculiarly prone to develop degenerative diseases, likewise to suffer from serious accidents, from which they recover slowly and with greater likelihood of permanent impairment.

A serological test is not included in the examination requirements, although we sincerely believe that it should be and have no doubt that some day it will. Some of you are making this test routinely and it is hoped that more of you will do so. It is our policy to accept applicants with positive serology provided they show no clinical evidence of the disease and are otherwise acceptable. Such applicants are kept under observation until they have had what we consider adequate treatment.

This is a real benefit both to the employee and the railroad. Without the test we are surely accepting for service a certain percentage of employees with positive serology who will later develop cardiovascular or C.N.S. lues. Applicants should be rejected by the company surgeons and not by the Medical Director's office. Although applicants approved by you are accepted for temporary employment only, if they are later rejected by the Medical Director complications frequently arise. The young man has been put to work and has worked for a period of about two weeks when he is suddenly informed that his application has been rejected. He feels that he has been unfairly dealt with. It sometimes happens that he has joined a union or a brotherhood, which adds to the difficulty. In one case recently the applicant had purchased a uniform. By the way, he isn't working.

I hope you will see the importance of those statements. We would much rather approve a man that you have rejected than reject a man whom you have approved, and we hope you will be very careful in approving employees for service, in the operating department especially. We believe that careful discrimination by our company surgeons will avoid these complications and insure the highest class of employees for the New York Central System.

Discussion

DR. MCCORMICK: The Doctor will remember that some time ago I wrote him a letter concerning rejection on eye test; I felt that the general surgeon could not reject the men on the eye examination that the general surgeon gives them. I maintained that it was the eye specialist's duty to reject them. Here the other day I had an applicant for employment. He was physically perfect in every respect, and when I put on the one-plus-fifty sphere lens he could read as far as 20-20. I asked him, "Is it clear?" He said, "Perfectly." Yet without that lens on he could read 20-15. I felt the individual in that case had rejected himself. Not being an eye specialist I did not know just why he could read when most of them say it blurs and can't see anything, yet this individual could. And without the lens, as I say, he could read 20-15. Can you explain that, Dr. Myers?

DR. MYERS: The Doctor is asking me questions about something I don't know very much about. So far as I know the eye requirements were not made by the medical department but by the operating department, and no doubt after consultation with oculists and men who really know vision. As to the case the Doctor has cited, I would not be able to answer his question, but it is my understanding that a young man who is able to read the 20-20 line through one and one half spheres is peculiarly liable later in life to develop serious errors of refraction, and I believe that is the reason. As I tell you, we have nothing to do with this. In our office we try to live up to the rules; if the rules say so we live up to them.

If you ask for my opinion I will say some of the rules—not that particular one—are too rigorous. I believe we could get along perfectly well with young men whose visions are correctible to normal providing they are not too bad without glasses, in almost any situation on the railroad. In fact, I have said frequently I would rather have a man with brains in his head who has to wear glasses to correct his vision than I would a young man who has perfect vision and lacks brains.

WE WERE told, when we tried to get vegetable salads into workers' canteens, to make good the loss of vitamin C which is almost unpreventable in large-scale cooking, that the 'hands' would not touch them. Wherever canteen supervisors have taken even moderate pains to encourage people to try salads—and I am speaking of wartime salads of shredded cabbage, grated carrot, potatoes, etc.—there has been a record of success.

—PROF. J. C. DRUMMOND, in a paper read before the Royal Society of Arts, London; *Nutrition Reviews*, November, 1942.

What Are We Examining For?

Types and Frequency of Physical Examinations

T. LYLE HAZLETT, M.D.,
Medical Director, Westinghouse Electric & Mfg. Co., Pittsburgh

OUR changing concepts of the physical examination in industry reflect our changing concepts of industrial medicine in general. When first instituted, the physical examination had little if any bearing on the type of work the employee was hired to do. In fact, in the earlier stages of its use, the most important function of the examination was to determine the employee's acceptability to an insurance program. If it had occurred to anyone a few decades ago that the physical examination might serve the specific function of determining the fitness of the applicant for the job he was to do, it is certain that this function did not receive any special emphasis. Only through a relatively slow evolution has the idea of adapting neuromuscular coordination, visual capacity and intelligence become a widely accepted rule of practice. It may be stated that, generally the pre-placement examination has for its major objective, the assurance of the utmost degree of compatibility between the worker and the job. I should like to emphasize at this point, that this is, in addition, one of the important phases of preventive medicine with which the industrial physician deals. It is true that from the standpoint of job efficiency alone the man must be fitted to the task; but it is also true that from the point of view of industrial hazards the selection of the applicant is of great importance.

There are two aspects to this question. One deals with the existence of physical conditions which may be aggravated by certain types of work and the other with physical defects which will increase the accident hazard not only to himself but to his fellow workers as well. In the first class we find the silicotic applicant who by continued exposure to silica dust is under greater menace of tuberculous infection than the applicant with reduced vision, abnormal hearing, epilepsy, psychoneurotic traits, etc. It must not be forgotten that even with the best mechanical safeguards the possibility of accident exists and that in the majority of cases, the human factor and not the mechanical one determines whether an accident will or will not occur. This does not imply that the pre-placement examination is a device to select only perfect human material to the elimination of all applicants who exhibit any physical defects. Such is, indeed, not the case. If it were, not only would the social loss be very great, but the pre-placement examination would lend itself to the perpetration of a cruel and inhuman discrimination. For it is a fact, recognized by physicians conversant with this field, that persons with physical defects do make acceptable and competent employees in occupations in which their deficiencies are not a handicap. We shall revert to this question later.

THERE are functions of the pre-placement examination which are vital to both industry and the employee and which are, in a sense, incidental to the main purpose for which it is made. One of these is the recognition of remediable defects. It is good practice to acquaint the applicant with these defects and then to urge the immediate correction of certain defects either as a condition of employment or as a condition of acceptance for an insurance program. For example,

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Texts of two of the Lectures of the third day of the Post-Graduate Course in Industrial Medicine at Long Island College of Medicine, Brooklyn, New York, November 2-13, 1942.

an applicant may fall below acceptable standards of visual acuity of the Snellen chart. Inquiry frequently reveals that he had intended to have refraction done. He is urged to consult an oculist. In our experience, many applicants are brought to enjoy the health benefits of corrected vision due to advice given at the pre-employment examination. Again, a case of more or less severe dental caries is accepted for employment. He is not, however, accepted for an insurance program until he has received dental care. It is evident that many conditions are thus remedied which might have been neglected indefinitely.

Mention need scarcely be made of serological tests made of all applicants. The individual and social benefits which have resulted are beyond ready calculation. Positive cases in non-infective stages have been permitted employment provided they place themselves under medical treatment. We may well assume that the pre-placement examination has been one of the means helping to stem the threat of syphilis.

Wherever possible, the pre-placement examination should include a chest x-ray. No greater contribution may be made to the eradication of tuberculosis. We feel that this is of great significance not only to the employee and his fellow-worker but also to society at large. It is true that tuberculosis has decreased markedly in the past 40 years; but it is likewise true that it continues to be one of the gravest threats to the health of mankind. Besides, in times of war, with the consequent hardships and privations, there is a tendency for the ravages of tuberculosis to increase. It is, therefore, of particularly great importance that x-ray films of the chest be a part of our present pre-placement examination. If the expense and the time required may appear to be rather excessive, I should like to remind you that one active case of tuberculosis, inadvertently placed among the other employees, might be the cause of much lost time, staggering expense in sick benefits, perhaps compensation claims, and unspeakable human tragedy.

I HAVE said that the pre-placement examination does not have, as its purpose, the rejection of applicants with physical defects. By that I did not mean that all applicants are employable, at least not in the positions they may desire. Some of them, such as the luetic in an infectious stage of the disease and the open case of tuberculosis are, evidently, not employable at all. However, we have given much attention to the utilization of men who are victims of physical handicaps. In fact, at the present time, it is necessary to employ large numbers of men whose physical conditions have made large numbers of them ineligible for military service. But aside from the present emergency, the tendency in industry has been to employ men with disabilities which were not potential hazards either to themselves or their fellow workers. The whole question is one of the man and the specific job he is to do. If the available job will aggravate a given disability or if the disability will place the safety of other workers in jeopardy, then the course of action is clearly one of rejection. Such a man should, of course, find his place in some other activity. Rejection for one given position does not mean that he is unemployable. A simple statement such as "This examination is made not for the purpose of rejecting applicants, but for the proper placement of those whose defects might be hazardous to themselves or those about them" does much to create better understanding.

No physician should consider himself competent to render a physical examination for job placement in industry unless he has a thorough knowledge of plant activities, job requirements and hazards. Where it is impossible for the physician who is required to make pre-placement examinations personally to acquaint himself with the various job requirements, a system employing job-specification cards may be used.

An occupation card which simply states the type of work is not a job card. It may, for example, fail to mention that a certain punch-press operation requires working with materials that may affect the operator's health.

Certain information relative to individual jobs must be the responsibility of the medical department, while the remainder is furnished by the employment department and the shop. It all may be correlated by the employment office, thereby giving the interviewers the information they need relative to the requirements of each particular job.

Much information on the job card is not necessarily of value to the examining physician, but it does afford him an opportunity to acquire complete knowledge of the jobs.

A complete set of job cards should be maintained in the employment, production, and medical departments. Those of the medical department contain much additional information of a purely medical nature, and an increasing amount of information becoming available to the physicians from many sources.

The type of pre-placement examination required, and the type and frequency of periodic examination, the materials used, and a description of the work and actual job conditions are shown on the card. This information gives the physician an intimate knowledge of the protective equipment, and at times he may wish to recommend additional protective equipment. With such a card, the types of examinations readily can be assigned and transfers controlled from the medical standpoint so that no man will be transferred to a job requiring a different pre-placement examination without the consent of the physician responsible for the workers in the plant.

WHEN the applicant reaches the medical department, a brief medical history is taken. This history includes an account of past diseases and injuries, surgical operations, family diseases, acceptability for insurance, vaccination, last medical consultation, marital status, etc. In addition the occupational history is elicited from the applicant at this time. This item is an important one from a medical standpoint, as the past occupational exposure will suggest special examinations in the individual case—such as urinary lead determinations for the painter, blood studies of the worker who has been exposed to solvents, etc.

Following the history, which is taken by an experienced clerk, the applicant is directed to the examining room where the physician who performs prescribed examination and obtains any additional data which the case may require. It would, perhaps, be superfluous to give details of the examining room setting. Suffice to say that individual cubicles should be provided for the removal of clothing, and that the physician summons the applicant to be examined and carries out his work under conditions of complete privacy. The examination includes the determination of the height and weight, tests of vision and hearing, inspection of the nose and oral cavity, inspection and palpation of the thyroid, and the appropriate steps required in the examination of the respiratory system, the nervous system and the extremities, the cardiovascular system, the abdomen, the genito-urinary system. Chest plates, urinalyses, and serological tests should be made for new applicants. Special tests should be made as needed for certain hazardous occupations, which may include patch tests for sensitivity, lead urinary determinations,

x-rays of the spine, etc. Vaccination may be necessary.

The classification of the applicant is then made on the basis of these findings. Our own scheme has, in our judgment, the virtues of simplicity and feasibility. We use but three classes, A, B and C. Many use A, B, C and D. We have defined these classes thus:

CLASS A. Approval for employment unless additional classification for the particular job is required. Includes those with defects corrected.

CLASS B. Approval for employment unless additional classification for the particular job is required. Includes those with defects which can be corrected without time loss. Includes former employees with defects which can be corrected with short period of time loss. Ratio of time loss to be directly proportional to length of service. Includes former employees with special skill, but with defects which do not incapacitate for work nor jeopardize life or health. Includes those with potential defects which in all probability will not become disabling.

CLASS C. Unsatisfactory for any occupation. Includes new applicants with defects requiring time loss for correction. Includes new applicants with potential defects which in all probability will become disabling.

Includes former employees with defects which cannot be corrected, service to be considered. Includes former employees with disabling defects which can be corrected and until such time as they are corrected.

All Class B applicants should be directed to return to the medical department at specified times so that progress in the elimination of the physical defect may be noted. While, at times, a defect may be of such character as to permit immediate employment, e.g. caries, infected tonsils, etc., sick-benefit association membership is not granted until remedial measures have been taken. Women should receive the same examination as men.

So much for a review of the pre-placement examination.

WHEN we speak of physical examinations in industry probably most of us think of the shop-worker as the examinee. The clerical worker and the executive in industry have probably, on the whole, enjoyed fewer privileges in this respect than the man in the shop. I should like to touch briefly on a cardiovascular survey of executive officers. I offer it as an important possibility in the development of the periodic examination program.

This survey was limited to the cardiovascular study of 692 executives between the ages of 30 and 67. It included electrocardiograms, blood pressure determinations, fluoroscopy for the study of cardiac contours, cardiac auscultation, and urinalysis. It was found that over 13% of the group exhibited one or more abnormal findings. Over 11% of the electrocardiograms revealed abnormalities; the blood pressure was found elevated in 7.6%; fluoroscopy revealed abnormal heart contours in 9.2%; auscultation showed 4% to have significant cardiac murmurs; and urinalyses were positive in 4%. Of the latter, eight cases exhibited glycosuria which had been previously unsuspected. These findings would appear to suggest the advisability of universal periodic examinations for workers in all divisions of industry. Such examinations should, as a rule, be of general character and not limited to one system.

There is one aspect of the medical examination which is not frequently mentioned but which is of fundamental importance in appraising the worker's "job fitness." This is the psychiatric aspect, which deals with the personality type and studies the individual from the point of view of emotional and intellectual traits and is most important during this period of increased strain. The balanced personality with adequate social adjustments obviously brings to his job and to his vocational contacts qualities which are distinct assets both to his personal contentment and to his vocational success. At present, little attention is paid to these psychiatric factors; only the most marked anomalies are apt to strike the examiner's attention.

I mention this matter as a desirable element to develop in our examinations. Then, in passing, I should like to mention psychological tests of such traits as mechanical aptitudes, skill in certain types of performance, extent of information in certain subjects, etc. These latter tests may well contribute to a more complete knowledge of the individual's potentialities; they are not, however, of direct medical interest and are usually administered by agencies other than medical departments.

There is still, in some quarters, the tendency to assume that curtailments in medical expenditures are synonymous with economy. Such is not the case, however. The savings actually effected by elimination of claims for pre-placement conditions or from unjustified claims may more than justify the financial outlay for the type of medical work we have described. Then again, the reduction of lost time, the placement of the individual in the type of work for which he is suited, the general increase in worker efficiency, the reduction of accidents, and the protection of our employees are in themselves strong arguments for an adequate medical program in industry, even if there were no humanitarian aspect to the problem. This aspect, too, has won far more recognition among the leaders of industry than is generally known. Many industrial executives would justify such a program from the humanitarian basis alone. However that may be, there are, as we have seen, material benefits of such extensiveness and character as to require no further justification.

In closing, I wish to emphasize, strongly, that the results of the type of program presented should be used to improve the conditions of work and to safeguard the worker. Furthermore, the medical program should not be inflexible but should be constantly adapted to the changing needs of the worker under the rapidly changing conditions in industry. In this manner the medical program will be ever alive and truly responsive to the worker's needs. It will thus be progressive and will keep pace with the development, not only of industry, but also of medical science with its ever wider horizons and ever increasing contributions to the welfare of the worker.

Special Types of Examinations

—Justifying Their Cost—

MARTIN I. HALL, M.D.,
Medical Director, New Departure Division, General Motors Corporation

THE purpose of physical examinations in industry is to help conserve and promote the status of health of all workers in all manner of employment, from the employee who performs the most menial task to the highest executive of the organization. The objectives are to place the worker at a job for which he is best fitted to do his work without harm to himself or his fellow-workers and to detect morbid conditions when they first manifest themselves.

Loss of Time Through Illness and Accidents

AMERICA'S millions of industrial workers lose an average of about 10 days each per year as the result of illness and accidents, and this does not include absences of less than a week. This represents a loss of at least 160 million man days a year. The value

of this lost time may be computed to represent loss in terms of wages, tanks or ships, spoilage, but no matter what comparison we use it is an obvious loss to our total economy and production effort. But even more remarkable than this is the fact that only about 10% of this absenteeism is due to occupational accidents and diseases, the remaining 90% being due to all other ordinary ailments of man not related to his occupation.

More and more women are gradually displacing men in our industries, and the industrial physician must expect to play an increasingly important role in promoting the health of this group. We know that sickness absenteeism among these employed women is very high; a daily absence of 10% is not unusual. Their annual absence rate exceeds that of the men by approximately 200%. Also, we know that they are more subject to certain occupational diseases than men. Arsenic, benzol, carbon disulphide, dinitrobenzene, lead, mercury, skin irritants, sulphuric ether, TNT, are among those substances to which women are particularly sensitive.

Fatigue and absenteeism play such an important role that they have become a major concern in industry. Therefore, I must emphasize that employers and the physicians serving industry must reconsider their past practices in the examination, placement and health supervision of this new army of female workers.

Since the advent of compensation legislation industrial medical and safety services progressed in a dramatic fashion because certain industrial, engineering, and medical leaders undertook the task of reducing the incidence and severity of accidents and then diseases incident to occupation. Now we must attack the absenteeism not due to occupation on a much wider front than has been the practice in the past. Only the surface of this problem has been scratched. However, as the result of this limited experience, statistics have accrued which definitely prove the tangible value of adequate health maintenance programs in industry.

Physical Examinations

THE company medical department is becoming less and less a surgery and first aid station and increasingly a clinic of preventive medicine, and it has been definitely brought to our attention that occupational hygiene is no longer only a matter of factory sanitation, but instead is concerned with every phase of the best utilization of the worker's capacity in his occupation. In this newer concept of industrial health service, physical examinations of the employed group assume a role of major importance—it is the corner stone upon which the whole program rests. Just imagine the large proportion of our adult population, so directly affected by this public health measure, who would not otherwise have voluntarily sought medical advice.

As physicians we are familiar with the benefits derived from prevention of disease and the discovery and treatment of incipient disease. The life span is prolonged, the economic and social burden is lessened and, therefore, the collective productive capacity is improved.

These advantages can be assured by instituting a program of physical examinations and consultations as part of the health maintenance program for the employed groups.

These examinations may be classified according to type, as follows:

1. Pre-employment or pre-placement examinations.
2. Periodic examinations.
3. Transfer examinations.
4. Re-entrance examinations.
5. Requested examinations or consultations.

Pre-employment Examinations

THESE have been fully covered by Dr. Hazlett. (See the preceding lecture.)

Periodic Examinations

THE purpose of this examination is to assist those already employed to continuous employment with a minimum of physical deterioration or sickness. They should be so designed as to assist in the uncovering of early morbid conditions that may not be apparent to the examinee, and to promote his general health.

Periodic physical re-examination of all employees, office as well as factory workers, whether or not exposed to hazardous conditions, is desirable at least every one or two years. What I wish to imply is that every one employed in an industrial establishment should have the benefit of this periodic examination at regular intervals.

In an electrical substation in Philadelphia 106 men were given complete physical and ophthalmological examinations. Fifty-seven were grouped as being without defects, and 49 with. The average lost time accident per man for a period of 10 years preceding the date of medical examination of those found to have physical defects was approximately three times as great as those without defects.[1]

In another group 50% of absences were found to be due to illness among 15% of the employees. During the three years that followed, 700 employees of this group had medical interviews and now have as good an attendance record as the rest.[2]

In a controlled study in which half of an employee group had periodic physical examinations there was found to be a definite decrease in the sickness frequency of this group as compared with those employees in the group not examined.[3]

Similarly, some of our insurance companies who report their findings after many years in promoting health among many of their employees and policyholders conclude that their results in promoting health are both measurable and favorable.

When as complete an examination as the pre-employment one is not feasible then a partial physical examination and selected laboratory tests may be substituted to great advantage. Other minimal types of periodic re-checking are possible, such as the employment of a personal history form without physical examination, aiming to ascertain whether symptoms are present, with the idea of referring selected cases to the family physician.

The frequency and extent of these examinations should remain entirely according to the judgment of the examining physician.

In those occupations presenting hazardous conditions, even though apparently controlled, or where the nature of the hazard requires special control it will be necessary to re-examine the exposed workers at frequent stated intervals. These examinations are sometimes referred to as periodic occupational examinations, the extent of which should be limited to one or more essential observations or laboratory tests depending upon the early manifestations of the occupational disease which is under suspicion and to which the worker is liable. Their purpose is the early diagnosis and treatment of occupational disease, adjustment in occupation if indicated, to aid in uncovering exposures that are improperly controlled, and to aid in educating the worker in the proper personal protective practices.

Because a hazard or exposure is said to be under control is not definite assurance that it remains so at all times, as the human factor as well as the mechanical one must always be taken into consideration. Theoretically, the precautions afforded may appear to be

sufficient to safeguard the worker against potentially harmful conditions, but despite these precautions occupational diseases do occasionally occur. Consequently, regardless of occupational safeguards the industrial physician must always remain suspicious, and the workers exposed to possible sources of disease should be examined periodically at stated intervals determined by the physician.

Transfer Examinations

EMPLOYEES to be transferred permanently or for an indefinite period from one job to another varying in nature and in physical requirements from the original occupation, should be examined prior to the transfer to determine physical fitness as well as to determine whether or not any harmful effects were suffered as the result of the original occupation. This refers not only to transfer to heavier work or to an occupation requiring certain minimal standards but also to the case of older or disabled employees being transferred to other work more suitable to their physical capacity. These supplemental pre-placement examinations need not be as extensive as the pre-employment examinations but should be such as the physician considers to be adequate for safe placement in the job to which the worker is being shifted.

Re-entrance Examinations

EMPLOYEES returning to work following enforced absences because of illness or injury should be reexamined before resuming their occupation. The extent of these examinations should again be left to the discretion of the examining physician. They are meant to protect the individual against too early resumption of his regular occupation, to protect his fellow-workers against contagion, to effect changes in occupation if indicated, and to protect the employer from unjust claims that may arise because of aggravation of disease after too early return to work.

Requested Examinations

THESE are such as any physician might make for diagnosis or counsel. The way to the medical department should be made easy for employees who desire to consult with the plant physician. The doctor should consult with these employees who seek his advice regarding personal health matters. He assumes the role as counsellor and not as therapeutist, because if he assumes the latter role, other than possibly offering treatment for the relief of an emergency condition or to enable the employee to finish his shift, he is overstepping his duties as the plant industrial physician.

Occasionally the plant physician is consulted by employees who mistakenly attribute ailments to occupation or are under the impression that pre-existing afflictions have been aggravated by their occupation. In adjudicating these cases the examiner must decide as to the responsibility, convince the employees, if decisions are contrary to their belief, and direct them into suitable medical channels if treatment or medical supervision is required. To do this effectively the doctor must have facts as to the adequacy of alleged responsible exposures and facts regarding the physical condition of the workmen involved since the start of employment. The former knowledge he should have acquired from thoroughly knowing his plant conditions; the latter he could have obtained only through physical supervision of the employed force.

Dismissal Examination

ONE may add still another set examination to the above group which is designed to determine the physical status of an employee who is severing his relationship with the company. This examination is particularly applicable to the worker who was exposed to a potential hazard and you wish to assure him as well as yourself that he suffered no ill effects as the result of his occupation. This examination may save much time and money because of claims, just or unjust, against the company after months or years following his leaving.

Question of Physical Fitness for Work

WHILE this question is one of vital importance in the physical examination program it is most difficult to establish a list of disabilities or defects which will dogmatically set the standard by which we may be governed in placing these people either before or after employment. Diseases, deformities, and disabilities are too variable in degree and extent to permit of a practicable schedule. In all such matters the clinical judgment of the examining physician plus his knowledge of plant conditions and job requirements plus his knowledge of industrial diseases must control, for with him should rest the decision in evaluating the physical fitness of an individual.

Though most industrial and mercantile establishments would prefer to employ and retain a group of men and women of the highest order, both physically and mentally, it is an ideal scarcely attainable in practice and particularly at this time when Uncle Sam urgently needs this very group. Men of inferior physique may have such special training as to render them most desirable employees in spite of physical handicaps. Also, it is not practicable that industry should skim the cream of the crop of labor applicants, nor is it a sound socio-economic measure to scrap tens of thousands capable of great service though they must be far from physically perfect, compensation laws notwithstanding. Most large industrial organizations can, with moderate care in placement, make use of almost any reasonably normal person through job placement provided there is an adequate health maintenance program.

It can be roughly stated, however, that several possibilities will arise to influence the physician's decision in this question of physical fitness for work. Examples of disabilities or diseases which would probably disqualify individuals from work are:

(a) Active tuberculosis

(b) Syphilis in the infectious stage until proof is submitted of proper treatment to insure prevention of spread of this disease. Syphilis involving the central nervous system and the cardiovascular system, being dangerous from the accident point of view, may be cause for disqualification in certain instances.

(c) Communicable or contagious diseases of any kind until recovery is complete.

(d) Hypertension, with damaged heart or kidney function.

(e) Serious defects of vision or hearing when the safety of others would depend upon these very senses.

(f) Others: Certain dermatoses; heart diseases; endocrine disorders; hernia; extremity disabilities; neurological disorders; and so on.

At the time of examination and when defects are found advice must be given then and there to the examinee as to what must be done and where to go for correction. No one welcomes the news that some disease or defect has been uncovered, but if the subject is approached in a sympathetic and helpful spirit you may rest assured that, in most instances, the patient will be everlastingly grateful for the help given him.

Benefits from Physical Examination Program

WHAT are the total benefits to be derived from this physical examination program? These are both tangible and intangible and, of course, must be set

against the cost. It would indeed be difficult for me to break down the cost as against the monetary benefits to be derived from each component part of an adequate medical service, but certain specific examples have come to our attention as the result of experience in certain industries and insurance companies and reports from such groups as the American College of Surgeons, National Association of Manufacturers and National Industrial Conference Board. I shall quote from some of their published reports, and I shall let you draw your own conclusions:

(a) In a recent survey by the N.A.M. the questionnaire used asked this question: "Do you consider your health program a paying proposition?" Some 1620 companies answered "yes," and the benefits derived were listed as follows:

Occupational diseases	62.8% reduction
Accident frequency	44.9% reduction
Absenteeism	29.7% reduction
Compensation insurance premiums	28.8% reduction
Labor turnover	27.3% reduction

(b) The Aetna Casualty & Surety Company, in emphasizing the dollars and cents value to management of industrial health service cited the two-year experience of a company whose health program reduced the compensation monies paid out from $3.92 to $.08 for every dollar of insurance premium. The company then continued to operate four years without a lost time accident, with consequent reduction of the cost of insurance. Furthermore, the factory's output of essential steel increased 50% and production costs were reduced by half.[4]

(c) In a small 115-man machine and wood-working factory a medical dispensary was installed at the cost of $600. The additional outlay for supplies and medical service amounted to $1660 per year, a net cost of $14.40 per employee. The result was an immediate direct saving in absenteeism of $3,420. Labor turnover was reduced 25%, and no major accidents occurred after the installation of this medical service.

(d) In a group of 6644 examined prior to employment among other diseases and disabilities we found—

Active pulmonary tuberculosis	11 cases
Uncomplicated occupational pulmonary fibrosis	10 cases
Pulmonary fibrosis with tuberculosis	2 cases
Sero-positive syphilis	40 cases

Conclusion

IF THE manufacturer who has never experienced the benefits that may be derived from an adequate medical service questions its value from the dollar-and-cents point of view then these experiences of other companies must be brought to his attention. It is now generally recognized that good health is an asset in that there is increased efficiency, better employment relations, less spoilage and absences from work, and reduced accident frequency. A doctor on call is not the answer to this problem. The medical supervision must be directed by a physician who knows industry and its needs, who makes regular rounds in the plant, and who supervises the general health of the force through physical examinations and consultations.

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Carbon Monoxide

FRANK S. ROSSITER, M.D.,
Carnegie-Illinois Steel Corporation, Pittsburgh

CARBON monoxide is a colorless, tasteless, odorless, non-toxic, non-cumulative, non-irritating gas which is the product of incomplete combustion. When a substance containing carbon burns in plenty of air, the carbon takes oxygen from the air freely, which amounts to two molecules of oxygen for every one of carbon, and thus CO_2, or carbon dioxide, is formed. Should there be an insufficient amount of air present, the carbon can absorb only one molecule of oxygen, and thus CO, or carbon monoxide, is created.

This gas has no direct effect on the body, but it does have an indirect effect in its action in combining with the hemoglobin of the red blood corpuscles, preventing them from performing their normal function of carrying oxygen to the various tissues of the body. This oxygen starvation of the tissues is known as anoxemia, and the effects produced by gassing are all the result of the oxygen-want in the tissues and are due to no other cause. The affinity of the hemoglobin for carbon monoxide is from 250 to 300 times greater than for oxygen, and the gas is therefore taken up in preference and in this proportion. This union of carbon monoxide and hemoglobin is a definite chemical compound having a distinct cherry red color, and it is due to this fact that the skin, lips and ears of the victim have a characteristic cherry-red color.

The factors entering into the absorption of the carbon monoxide by the blood are the concentration of the gas in the inhaled air, the length of exposure, the rate and depth of the respirations, atmospheric conditions, and the general health of the individual. At first, the rate of absorption is rapid, but it is slowed down as the saturation of the blood with the gas increases; a greater amount is absorbed during the first hour than succeeding hours. When low concentrations of the gas are inhaled, there tends to be an equilibrium produced between the gas in the inhaled air and the amount in the blood and, when this point is reached, no further absorption takes place, no matter how long the contaminated air is inhaled. Inhaling a 0.01% concentration can only saturate the blood to 17%, and a 0.05%, to 40%. Inhalations of high concentrations saturate very rapidly and death may result in just a few breaths. The individual susceptibility to carbon monoxide is of minor importance. The young and old, particularly those having arteriosclerosis, and persons suffering from anemia seem to be more susceptible. Repeated daily exposures to small concentrations of the gas make one less susceptible, owing to the fact that daily exposure

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causes an increase in the hemoglobin and the number of red blood cells.

Both the absorption and the elimination of carbon monoxide from the blood follow the law of natural diffusion of gases. When the tension of the gas in the inhaled air is greater than that in the blood, the gas travels inward, saturating the blood to the extent of the amount of gas in the air; when the tension in the blood is greater than in the air, there is a reversal of the process and the gas diffuses out of the blood into the lungs and is exhaled. Immediately on removal of the victim to the fresh air, the elimination of the gas from the blood begins. The factors entering into the rate of elimination depend on the rate and depth of the respirations, the percentage of saturation of the blood and the method of treatment. The rate of elimination is rapid at first but slows down as the saturation decreases, that is providing the victim is breathing.

Regardless of how high the percentage of saturation of the blood has been, practically all the gas is eliminated in eight to 10 hours, but a small amount of gas may remain in the blood for a much longer time. About one-half the gas is eliminated during the first hour. It is erroneous to think the gas can remain in the blood for days. If pure oxygen, or a mixture of carbon dioxide and oxygen, is inhaled, the rate of elimination is greatly increased. Once the blood has been freed of the gas, the corpuscles are found not to have been destroyed or altered in any way and they immediately resume their normal function again.

The symptoms of carbon monoxide gassing are always in accordance with the percentage of saturation of the blood, or, in other words, they depend on the amount of blood that is free to carry oxygen. Up to 20% saturation there are no symptoms; from 20 to 30% there is flushing, tightness in forehead with slight headache; 30 to 40%, severe headache, dimness of vision, weakness of knees, dizziness, nausea and sometimes vomiting; from 40 to 50%, the symptoms are more pronounced, with increased pulse and respiration; at 50% or a little higher unconsciousness takes place; from 60 to 70% there is depressed heart action and respiration; death takes place at about 80% saturation. In addition to these symptoms there may be exhilaration at first, muscular twitchings, convulsions, tremors, loss of memory, mental confusion, hysteria, delirium, or paralysis. When high concentrations of the gas are inhaled, the victim may not experience any of the above symptoms but suddenly collapses. Death in these cases is due to paralysis of the respiratory center owing to a severe anoxemia.

As to the prognosis in gas cases, if not dead when found, practically all recover in from a few hours to several days. All the damage done in these cases takes place during the time the gas is combined with the blood causing an anoxemia in the tissues. If this anoxemia has been both prolonged and severe, there is a slight possibility that a degeneration may set up in the brain giving rise to after-effects. These after-effects depend on the area of the brain affected and the extent of the degeneration. If the anoxemia has not been too severe or prolonged there may be only irritation of the brain cells without degeneration, in which case the symptoms soon disappear, leaving no after-effects. However, if a degeneration is once set up in the brain, it may remain stationary or become progressively worse, ending in death some time after the blood has been entirely freed of the gas. In cases where the degeneration becomes progressively worse, there may be a period of time during which the victim has apparently recovered from the acute effects of the gas only to have a relapse with severe after-effects.

Once a brain cell has degenerated, it is never regenerated and the effect produced becomes permanent. The after-effects manifest themselves in the form of loss of memory, paralysis, amnesias or other mental disorders, and are most liable to occur in those of advanced years or in those having arteriosclerosis. The number of cases suffering after-effects, or injury to tissues, even the brain, is extremely low in comparison to the number of cases that are severely asphyxiated. It has been my experience that after-effects are extremely rare, although some of the cases I have seen have been unconscious for long periods of time.

THE question now arises as to just how much oxygen want in a tissue is necessary to cause a degeneration. The brain suffers first because of its inability to stand oxygen-lack as well as other tissues, owing to the large amount of oxygen it consumes, but even in the brain all areas are not affected alike. The cells of the cerebrum are twice as susceptible as those in the medulla and, for this reason, mental derangement, loss of memory and long periods of unconsciousness are sometimes seen following severe gassing. Haldane states that the tissues use only one-third the oxygen furnished them by the blood during rest and two-thirds when fairly heavy labor is performed, the remaining oxygen coming back to the lungs again. Owing to the fact that nature has provided no reserve supply of oxygen in the body, as it has with fat, water, salts, etc., an extra supply is found in the blood for use when there is an extra demand for it. From this it will be seen that the blood under ordinary conditions furnishes more oxygen than is needed. In gas cases the blood, therefore, can be fairly highly saturated before there will be enough anoxemia to cause a degeneration resulting in any permanent damage. Since the blood must be 50%, or a little higher, saturated before unconsciousness is produced there can be no after-effects unless the victim has been gassed to this extent due to the fact that the other 50% of the blood, free to carry oxygen, can supply enough of it to prevent any degeneration.

When there is an extra demand for oxygen by the tissues, in addition to the reserve supply in the blood, several compensatory mechanisms may be brought into play. The spleen, which is a reservoir for red blood corpuscles, can give a great many of these cells to carry an additional supply of oxygen in the blood; the bone marrow, where these cells originate, it is claimed, can be stimulated giving more of these oxygen-carriers to the circulation; and it has also been claimed that when there is an excessive demand for more oxygen, the lung tissue is capable of actually secreting oxygen.

Pneumonia, anemia, tuberculosis, heart lesions, nephritis, various nervous and mental disorders, and almost every known condition are quite often attributed to carbon monoxide, but I can see no logical or scientific reason why this should be true, as this gas is non-toxic, non-irritating and has no cumulative effect. This gas should not in any way be compared with the highly irritating war gases like chlorine, phosgene and mustard gas. It is perfectly true that in severe prolonged anoxemia there might be symptoms referable to the brain, and it is possible that other tissues might be affected if extremely severe gassing has taken place, but other tissues cannot be affected unless the brain is also affected. These points are often overlooked when various complaints are attributed to mild gassing in which the blood saturation has not been high enough to cause any appreciable amount of anoxemia.

Pneumonia is often mentioned as an after-effect of

gassing, but it is surprising how rarely it occurs even after severe gassing. When it does follow, it is not due to any irritating effect of the gas but to the fact that while in an unconscious state saliva, infected mucus, vomitus or other foreign material gets into the respiratory tract causing irritation. Other factors are the slowing of the circulation and respiration, or the victim may have been rushed to the cold air and he may have been lying on the cold ground while artificial respiration was being performed. Tuberculosis is not often directly attributed to carbon monoxide, but it is frequently claimed that this gas aggravated a pre-existing condition. The only way this could be true would be by contaminants.

Anemia, sometimes mentioned as an after-effect, has been seen in cases of garage workers, and in these cases contaminants such as burned oil, unburned gasoline and benzol, known to be protoplasmic destroyers, have been the real cause. Anemia from inhalation of natural gas would be impossible, as there is no carbon monoxide in this gas. It has been proved in many experiments and surveys that there is a tendency to increase the percentage of hemoglobin in the blood and the number of corpuscles by the inhalation of low concentrations of carbon monoxide over a period of time. There is no reason whatever for anemia to follow a single acute case of gassing.

It has been said that carbon monoxide has a predilection for the nerve endings in the heart, but no convincing proof has been offered that this is true. Any action on the heart is caused by the anoxemia in the heart muscle itself and if the gassing has been severe enough to affect the heart, the brain will also be affected and there will be symptoms referable to brain injury. There are no grounds to attribute nephritis to CO gassing. It is true there may be a temporary glycosuria in these cases, but this has no effect on the kidney structure. All the other conditions attributed to gassing, such as insomnia, nervousness, loss of weight, optic disturbances, etc., can usually be traced to some underlying cause other than carbon monoxide.

At this point I would like to make a few remarks concerning the slow or chronic carbon monoxide poisoning. By chronic carbon monoxide poisoning is meant the alleged effects produced by the inhalation of low concentrations of this gas over a long period of time, and these should not be confused with the true after-effects sometimes seen following severe gassing where the victim has been unconscious for a long time. After a careful study and an extensive investigation, together with my personal observations over a period of 30 years, I do not believe that such a condition as chronic poisoning exists. No definite proof or convincing evidence has been given, and the leading authorities on the subject have not accepted it as a fact. Practically everyone admits the gas is non-toxic and that the effects are due to anoxemia, but those who talk about chronic poisoning fail to take into consideration that there is no anoxemia unless there is severe gassing and that the victim must be rendered unconscious. It is true that men exposed to small quantities of gas over a period of time attribute various complaints to the gas, but I have arrived at the conclusion that all their symptoms can be traced to some underlying condition, which, when corrected, gives immediate relief.

Such symptoms complained of as headache, dizziness, palpitation, digestive disturbances, nausea, tired-out feeling, loss of memory, anemia, insomnia, general weakness, loss of sexual desire, constipation, etc., may result from many different causes. These symptoms cannot be distinguished from the symptoms of ill health which are generally associated with age and the nature of one's work. In making a diagnosis as to the cause of these symptoms, it is necessary to take into consideration many factors pertaining to work, life and general health. Work may compel a man to stand or sit all day; he may be subjected to excessive heat and humidity; the ventilation and general working conditions may be poor; he may be forced to work under artificial light; there may be extreme noise and vibration about him, and dust and other fumes may play some part. He may have marital or financial worries. Poor food, errors in diet, dissipation, unhygienic living are great factors, as well as bad teeth, bad tonsils, gout, rheumatism, exposure, syphilis and alcoholism. When we consider all these things and our present knowledge of the mode of action of this gas on the human system, I believe the possibility of carbon monoxide causing any chronic condition is very remote. However, it must be remembered that contaminants with the gas may cause ill-effects.

U. S. Public Health Bulletin No. 186 gives an experiment in which six students, exposed four to seven hours daily to two, three, and four parts of carbon monoxide per 10,000 for 68 consecutive days, showed a distinct increase in the hemoglobin accompanied by an increase in the number of red blood cells with no other changes in the body. A survey of the conditions existing in the employees of the Holland Tunnels, New York City, by Drs. Sievers, Edwards, Murray and Schrenk, revealed the following: 156 men, average age 41, exposed to an average of 0.7 parts of CO per 10,000 daily for 13 years did not reveal any evidence of injury to health attributable to carbon monoxide. An article in *J.A.M.A.*, February 26, 1936, by Shillito, Drinker and Shaughnessy, reports an investigation of 21,143 CO cases in metropolitan New York, all severe enough to require hospitalization, in which only 43 had any after-effects. Of these, 23 recovered, 11 died, and only nine had chronic after-effects, and all these effects were referable to the nervous system. These results compare favorably with my own observations over a period of 30 years.

As to the treatment of carbon monoxide cases, there have been no new developments recently, and this part of the subject can be summed up in just a few words. As a preventive measure the following precautions should be observed: No one should ever be allowed to go into a place suspected of gas unless protected by some sort of breathing apparatus; all places should be tested for CO using some approved CO detector before allowing a workman to enter; when practical, a rope should be attached to the man in case anything should go wrong; large numbers of employees should be trained in the use of breathing and oxygen apparatus and in artificial respiration.

When a victim has been gassed, remove to the fresh air, loosen clothing about neck, and, if the breathing has stopped or is poor, perform artificial respiration by the Schaefer Prone Pressure Method, immediately, and continue for at least two hours or until the breathing is normal. It is essential to treat the case at the site of accident after removing him to the fresh air and at once. After breathing has stopped for 10 minutes or longer it is impossible to resuscitate the patient, owing to certain pathological changes in the brain. Prompt and efficient first aid treatment has been the means of saving hundreds of lives and preventing after-effects.

When available, oxygen or a mixture of oxygen and carbon dioxide, should be administered in conjunction with the artificial respiration. It should also be used in mild cases and cases where artificial respiration is not performed in order to free the blood of the gas

more rapidly and lessen the pains and headaches usually following gassing. I am not in favor of the oxygen-carbon dioxide treatment in the extremely severe gas cases, owing to its stimulating effect on an already weakened heart.

In cases where the breathing has stopped, the E & J Resuscitator or Pulmotor should be used, but no valuable time should be lost awaiting their arrival. Start artificial respiration at once. The E & J Resuscitator has been accepted by the Council on Physical Therapy of the A.M.A.

During treatment the patient should be kept warm by hot-water bottles, blankets or electric pads; the muscles should be massaged to stimulate the circulation; the mouth should be cleared of mucus and foreign material; no exertion should be allowed immediately after recovery; when considered safe the victim should be removed to the hospital by stretcher; after a man has been gassed he should not be allowed to go back into a contaminated air again as a little more gas may cause him to collapse. The use of methylene blue, venesection and blood transfusions are to be condemned as they might do more harm.

The after treatment is mostly symptomatic, absolute rest and quietness are essential after severe gassing; tonics, nourishing food and plenty of fresh air are called for. For the edema of the brain causing intercranial pressure and the resulting symptoms sometimes seen following severe gassing, the use of intravenous injections of a hypertonic saline solution or glucose is recommended.

Women in Industry

— Their Problems of Health —

MILTON H. KRONENBERG, M.D.,
Chief, Division of Industrial Hygiene, Illinois State Department of Public Health, Chicago

MORE than 13,000,000 women representing over one-fourth of total employment, are now working in this country." "Two million more employed women will be needed by the end of 1942, and at least 5,000,000 more women than are employed now will be needed by the end of 1943." "The employment of women in aircraft assembly plants has increased 10-fold since Pearl Harbor." "It is estimated that over 200,000 women will be at work in munition plants by the end of this year." The foregoing press releases make up today's headlines.

But women have always worked. Visit any one of a thousand factories in America today and you will find women employees.

To women workers, the present crisis has brought extraordinary recognition. The newspapers we read daily tell stories of their achievements. Employers are united in praising their power to increase output. Applause instead of pre-war discouragement greets those who venture into new fields—as machinists, crane operators, shipbuilders, riveters, welders, etc.

One of the most striking features of America's economic development has been the increasing number of women income earners. During the last half century, America has created many new kinds of jobs, and many of them have been for women. New inventions, mechanization of industry, the division and subdivision of labor tasks, as well as the centralizing spirit of the day has made it possible for these women to enter the shop and factory. It is idle, indeed, to speak of the exclusion of women from the occupations. Women are in industry to stay.

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Society as a whole is interested in women chiefly as wife and mother, and only incidentally as an industrial factor. Today, on the other hand, as the effect of this departure from the natural inclination and destiny of women, the problem has become of interest to and is being studied by physicians, nurses, welfare workers, sociologists, economists, management, and labor and governmental officials.

In dealing with this problem, there is need for much more detailed study as to job requirements and to women's peculiar qualifications. Also, what importance, if any, is to be attached to the physical and mental differences of men and women employees. Furthermore, what is their relation to productivity, to efficiency, to morale, and to cooperation with management. The general public on occasions has taken sides, often bitterly, usually influenced by personal considerations. At this moment, it is important as never before that the question of the employment of women in the industries of this country be dealt with in a sane and reasonable fashion.

When women normally outside the labor force are brought into industry, the problem is more than one of technical methods per se. In addition to the need for physical fitness, it also becomes a psychological and social problem. We cannot divorce ourselves from these items because they can create episodes which may affect the health and well-being of women workers and in turn disrupt production. The process of readjustment to war production as demanded today is not entirely smooth, and adverse effects may fall particularly heavily on women. This means that unless we anticipate and analyze whatever differences exist, our problems may increase in scope. We cannot and should not merely look upon the problem as an "endurance test" for women.

In order to make the entry of women in factories as easy and successful as possible, certain problems affecting women in industry must receive special consideration.

We will need women in industry, of that there can be no question. We are going to need them in increasing numbers, and now is the time to prepare and develop plans and policies, so that as we continue to utilize their abilities, we will be able to proceed along logical, fair and well-planned lines. This will prevent needless waste, illness, accidents, production upsets, as well as social problems.

Type of Work

WITH the exception of jobs requiring heavy lifting and great physical strength, women can be employed on most any job. They have certain peculiar qualifications for painstaking, tedious and repetitive work requiring great patience, and for finger dexterity. In such jobs they exceed the production of men. While women may lack experience, they do not lack mechanical ability.

Jobs should be tailored to meet the physical limitations of women. Women are generally shorter in stature, which means that bench heights may have to be lowered. Woman's reach is shorter, which limits her stretching to levers, racks, etc.; her hands are smaller, thus limiting the size and weight of hand tools.

Weight Lifting

IT HAS been recognized, since women first worked, that they should not be allowed to lift heavy loads or do work requiring great physical exertion if they are to be efficiently employed. While in England it has been reported that women are allowed to lift one-third their weight, it is felt that this is too great. Some employers of large numbers of women have set 30-40 pounds as

the maximum. However, it is felt that a standard is difficult to set, for there are many factors upon which the safe lifting load depends. For example, it is necessary to know how sustained the lifting effort is, the height of the lift, the degree of the body turning necessary during the action, and the weight of the worker. It would be safer to limit the lifting of women to 15 pounds except where the plant physician has deemed it safe. Women are naturally awkward lifters, mainly through lack of practice.

Selection

KNOWING the types of work that women can do in industry and having worked out plans for securing their services, the next step is that of proper selection. Among the qualifications to be considered are: (1) Age. (2) Marital status. (3) Past experience. (4) Education. (5) Physique. (6) Health. (7) Adaptability. (8) Dexterity. (9) Intelligence. (10) General attitude. (11) Temperament. (12) Cleanliness.

It has been suggested that women be tried at different tasks before determining what they might best be suited for.

Regarding the question of selection, it seems to me that candidates for employment might even be classified by local boards, not only with reference to physical and mental fitness, but economic, social and home status, and also that industry furnish these selection boards with data stating the kind of work available, location of plant, conveniences for female labor, housing conditions and other necessary and important factors affecting women workers.

Training

MANY of the women who apply for jobs will be totally unfamiliar with factory work, the operation and the handling of machinery. The instructors to be used should be selected on the basis that they can impart their knowledge to others and should be selected for their ability to explain things clearly; for pleasing personality, tact, patience, sympathy and consideration for the rights of others. Wherever possible, unusually masculine men should not be put in charge of instructing women. However, instruction should be given first by men, then by women who become most proficient. In connection with the general plan of instruction, industrial training centers are proving successful.

Hours of Work and Fatigue

THE experience gained during the last war is conclusive that long hours and fatigue impede production. The individual handicapped by the physical poisons produced by fatigue cannot work so rapidly or so effectively. The matter of hours of work and fatigue is most important in connection with the utilization of woman labor. It can well be said that the success or failure of the movement depends to a great extent upon what we do with reference to these things. The disabilities to which women are liable are readily caused or accentuated by irregular hours and habits. These conditions may become chronic and render the subject unable to continue her work or prejudice her future health. Fatiguing occupations and environments slow up the worker, increase the danger of accidents, induce various forms of nervous disorders and lower the resistance of the worker. If it is at all possible, there should be transference of workers on monotonous processes to avoid fatigue. Workers have been known to play "fatigue hookey," because they were just too tired to work long hours. While there has been a striking trend toward the shortening of working hours and the lessening of fatiguing factors, under emergency powers those benefits and standards slowly achieved are often interrupted. In many states to meet the war production demands, the need for longer hours is met by issuing emergency permits after a careful investigation that such a need exists. These have a limited time and are revocable.

Seats for Women Workers

NEITHER continuous sitting nor continuous standing is to be recommended. A chair should be provided though for each woman employee and she should be encouraged to use it. Much unnecessary fatigue can be prevented by the provision of suitable seats. Anatomically ill-adapted seats, as well as the orange or shipping crate, should be discouraged. One should be selected that is suitable for the type and nature of the work performed. The work should be laid out, if practicable, so that the employee can continue her work as well while standing in order to allow some change in the working posititon

Rest Periods

IN PRACTICE, the worker will probably procure relaxation in two ways: (a) by a short pause between repeated movements or groups of movements, and (b) by shorter or longer intervals of complete rest. It has been proved that total work accomplished in a given period was progressively increased by periods of relaxation, and employees on piece work who have protested against the imposition of compulsory rest pauses at regular intervals, have not infrequently been astonished to find that their output has been thereby increased, while fatigue was at the same time reduced. A 10-minute period should be provided during the morning and afternoon. Some operations require a five-minute rest period out of each hour. Many progressive plants also furnish suitable, well equipped quarters, with reclining chairs and couches for their women employees.

Night Work

MOST employed women have responsibilities outside their hours at the place of business—whether married or single, they bear some shares in the care of the home. The midnight to 8:00 A.M. shift is not recommended. There is a considerable body of medical testimony as to the deleterious physical effects of night work. In most cases this comes far more quickly with the woman than the man, not only because of her different physical make-up, but because her work does not end when she leaves the factory. Manifold household duties and cares await her on her return home. Outside of great emergency and absolute industrial necessity night work for women should be restricted. When night work is necessary, some companies provide transportation for women, as well as other conveniences and protection, especially when the plant is difficult to reach by standard means of transportation.

Workroom Environment

CONDITIONS of work, such as the prevention of overcrowding, adequate ventilation, temperature and humidity control of the air of workrooms, as well as efficient methods of heating and lighting, are all factors of special importance. If the working conditions are poor, selecting the best of women and paying them the highest wages will not suffice. Workrooms should a'so be generously lighted with the illumination properly selected and placed.

Labor saving devices should be installed wherever possible to eliminate lifting and handling by women. Safety appliances should be given the most careful attention.

The sort of toilet facilities often found in factories where men work will be offensive to the woman em-

ployee. While no white tile need line the walls, there is no reason why a coat of paint cannot be applied. Another facility the women appreciate is a coin-in-slot dispenser for sanitary napkins. In regard to drinking and washing facilities, no worker, male or female, should be without these facilities.

Rest rooms, comfortably fitted and cheerful, should be provided. Books and magazines are always welcomed. Many factories, in order to afford mental and physical relaxation, provide music either by radio or victrola. It is especially recommended for women employees.

A matron should be employed where groups of women work, so as to look after the general welfare of the female employees. If possible, this matron should be a nurse. These rest rooms may also include coin dispensing canteens approved by the management and the plant physician. There should also be a lunchroom, cafeteria, or restaurant which will furnish the worker a well-balanced meal during reasonable hours of the work day

Working Clothing

SAFE work clothing is of utmost importance for the safe employment of women. Earrings, necklaces, bracelets, wrist watches and loose fitting dresses should be prohibited at machines. Hairnets or caps should be worn. The type of clothing to be provided depends upon the kind of work to be performed. Near moving machinery, no wide skirts, loose sleeves, flowing ties or frills of any kind should be allowed. Slacks with tucked in blouses or coveralls have been found effective and can be made attractive. Neither slacks nor sleeves should have cuffs. Most women like to wear uniforms of some type for they add to their feeling of importance.

Long hair is a serious problem, for static electricity can cause serious accidents at machines. Therefore, caps, turbans or nets should be provided. Shoes are likewise important. Uncomfortable shoes cause fatigue and may result in accidents. A common cause of accidents among women is tripping on stairs due to catching the heel. For comfort and safety, low heeled closed-toe shoes should be required. Low heels prevent turned ankles and fatigue, and closed toes prevent injuries from stubbing the toe and the entrance of small particles of metals or other materials. Safety shoes are highly desirable for preventing toe injuries.

There is protective clothing for practically every type of work. Working clothing for women should be standardized. If all are dressed alike, there will be less rivalry as to dress and less in the way of comments.

Living and Social Conditions

SINCE women entering many of our defense industries will be drawn from surrounding communities and other distant areas, they will require clean and wholesome places to live. A careful canvass of the neighborhoods and families should be undertaken and boarding houses investigated before housing women workers. Social interests of an uplifting character should be encouraged. I am of the opinion that the contentment of a woman employee depends one-third on her wages and working conditions, one-third on living conditions, and one-third on good wholesome amusement. Employers can do much to see that the right conditions are provided.

Children and Working Mothers

WAR results not only in casualty lists that we read about, but it has other serious features that show themselves less clearly but affect the future. I refer to the care of children of working mothers. These children must be cared for while they work. They must not be parked with careless neighbors or turned over to greedy "baby farms," nor to foster parents whose only interest is in the fee they get. West Coast aircraft factories are beginning to supply their own facilities. The Douglas Aircraft Company has established a day nursery to accommodate 500 children. In Seattle, seven nurseries were opened in public schools. Conviction that a woman worker can be more productive if she is assured that her home problems are being taken care of is the point raised by these war industries. At present, nine different government agencies are attempting to work out a day nursery program for employed mothers.

Pregnancy and Women in Industry

WHILE it is difficult to lay down hard and fast rules that will fit every situation, some individualization of arrangements may be necessary. Female workers can often remain until the eighth month of pregnancy on some jobs. Standards have recently been published by the Children's Bureau of the Women's Bureau of the United States Department of Labor with regard to pregnant women. (See INDUSTRIAL MEDICINE, October, 1942, p. 491.)

The general recommendations are as follows:

1. Facilities for adequate prenatal medical care should be readily available for all employed pregnant women. The personnel management or physicians and nurses within the plant should make available to employees information about the importance of such services and where they can be obtained.

2. Pregnant women should not be employed on a shift including the hours of 12 midnight and 6:00 A.M. Pregnant women should not be employed more than eight hours a day nor more than 48 hours per week, and it is desirable that their hours of work be limited to not more than 40 hours per week.

3. Every woman, especially a pregnant woman, should have at least two 10-minute rest periods during her work shift.

4. It is not considered desirable for pregnant women to be employed in certain types of occupation: (a) Occupations that involve heavy lifting or other heavy work. (b) Occupations involving continuous standing and moving about.

5. Pregnant women should not be employed in the following types of work during any period of pregnancy: (a) Occupations such as operation of punch presses. (b) Occupations involving exposure to toxic substances which are considered extra hazardous during pregnancy: aniline; benzol and toluol; carbon disulphide; carbon monoxide; chlorinated hydrocarbons; lead and its compounds; mercury and its compounds; nitrobenzol and other nitro compounds of benzol and its homologues; phosphorus; radioactive substances and x-rays; turpentine and other toxic substances that exert an injurious effect upon the blood-forming organs, the liver, or the kidneys.

6. A minimum of six weeks leave before delivery should be granted.

7. At any time during pregnancy a woman should be granted a reasonable amount of additional leave on presentation of a certificate from the attending physician to the effect that complications of pregnancy have made continuing employment prejudicial to her health or to the health of the child. Regarding her return to work, it is recommended that in uncomplicated cases, a period of six weeks following delivery is agreeable.

Women as Accident Hazards

MOST women hurt on their jobs are injured needlessly.

While as a rule men are victims of the most serious

of injuries, in general from 1930 on, an increasing proportion of the persons injured in industry were women.

The fact that women seldom have had the exposure to things mechanical which men have had before they enter industry, means that women are not as conscious as men of the possibilities of injury from causes that may be somewhat obscure.

Women can work as safely as men with proper training and effective machine guards. However, since women's hands are smaller, machine guards should be set closer and substandard guards should be eliminated. It has been reported that power machines cause two-thirds of women's permanent partial injuries and that the punch press is responsible for half the machinery accidents. Therefore, a vigilant machine guarding program should be instituted. It must be remembered that the reaction after an accident will be much greater among women. A recent experience indicates that long tapering finger nails are also the cause of accidents among those newly employed.

Sickness and Absenteeism

FROM the medical viewpoint, the physician knows that the burden of sickness varies with sex. Absenteeism among women will result from occupational and non-occupational illnesses. It has been reported that sickness absenteeism among women in industry is high. A daily absence of 10% is not unusual. Their annual rate exceeds that of the men by approximately 60% and their disability periods are correspondingly higher.

To what extent the four strains of female sex life, namely, puberty, menstruation, childbirth and the menopause, contribute to the problems of women in industry as workers, I am not prepared to answer directly. However, we cannot deny that these peculiarities may play a part and do exert an influence.

In Great Britain, where the postal system constitutes a fair cross-section of one group of industrial workers, the Chief Medical Officer reports that among the chief causes of absence, nervous disorders of a psychoneurotic type constituted 7.5% for males and 13% for females. Furthermore, in England today, the entrance of women in industry is stressed as a cause of high mortality from tuberculosis.

In an attempt to explain the high absenteeism rate for women, one authority believes that the finer constitution of their nerves undoubtedly enables them to feel earlier, and before they are perceptible outwardly, those ailments and changes which may be going on in their system; and, however, indistinct such a feeling may be in them, they are more impelled by it than men to complain against a threatening evil.

Susceptibility to Toxic Materials

IT IS impossible to tell how much illness and death have resulted from the poisons employed in manufacturing operations and processes. Detailed medical studies covering this phase have been lacking.

In the opinion of many, women have proved to be more susceptible than men to the action of industrial poisons. There are two substances that apparently affect women more seriously than they do men. These are lead and benzol. Other materials believed to more severely affect women are TNT, carbon tetrachloride, carbon disulphide and mercury. There are other industrial processes and operations which are unknown or in their infancy, and may, as time goes on, add to the many sources inimical to health. However, the prohibition of women's work in occupations exposing them to these dangers will not solve the whole industrial problem if male workers are likewise affected. Every effort should be made to protect workers from all poisonous substances; and, so far as possible, the use of other substances should be instituted for those found dangerous. Industrial hygiene plant surveys will assist in uncovering sources hostile to health, and the results can be integrated with the medical control program. In this way the early manifestations of physiological upsets can be detected.

In connection with the problem of toxic substances, provisions covering employment of women in Michigan are as follows: Women shall be prohibited in the handling of any of the following substances or in the following operations, unless ventilation and working conditions are approved—lead, benzol, carbon disulphide, mercury, arc welding, dry grinding wheel. It is possible that other states have and will set up similar recommendations.

In closing, I should like to make the following statement. In the past there has been much theorizing about women and the labor she does. This leads me to the following conclusions: (1) That the treatment of women is one thing; (2) her legal status another, (3) her opportunities for public service still another; and (4) the character, type and extent of her labors and what she requires and should be afforded to make them effective and insure success belong to a distinct category. It is on the latter two points that we must focus our attention.

More About Noise

EDWARD PODOLSKY, M.D.,
Brooklyn, New York

MANY years ago Dr. Walter B. Cannon, of Harvard, found that noise may seriously affect the normal digestive functions and in this manner be the cause of nervous indigestion. He did his classical experiments with cats and x-rays, and proved conclusively that loud noises were enough to halt or disturb the normal digestive rhythms of the stomach. Later the acoustician, E. Lawrence Smith, went several steps further. He measured noises in degrees of intensity and found that noise at the level of 60 decibels had a decided effect in deranging digestions.

At about the same time Dr. Donald A. Laird undertook to study the effects of noise on digestion. Early in his investigations he found convincing proof that the loud noises which are inseparable from our modern civilization play an important part in arousing nervous indigestion by decreasing the flow of saliva in the mouth and gastric juices in the stomach.

Dr. Foster Kennedy has shown most spectacularly that noise has a definite effect on the brain. Through the use of a device measuring actual increase of pressure on the brain, in experiments carried out at Bellevue Hospital, Dr. Kennedy discovered that the bursting of a blown-up bag raised the pressure higher than morphine or nitroglycerine, the two most powerful drugs known for increasing pressure within the brain. The paper bag explosions raised the brain pressure four times above normal, with a second interval before returning to normal pressure.

Dr. Charles Warren, an eminent British ear specialist, particularly interested in the effects of noise on the ears, found that persons living in noisy surroundings developed some interesting changes in hearing apparatus. Continuous noise was found to produce thickening of the ear drums, with a subsequent loss of movement. There was also a stiffening of the small bones within the ear and a loss of movement on their part. The cartilage around the aural window was also found to thicken, with a loss of motility. The hearing nerve

This is a continuation of Dr. Podolsky's discussion of "What Noise Does to Health," (INDUSTRIAL MEDICINE, November, 1942, page 533).

itself finally became exhausted, with a subsequent failure to transmit sound in all its niceties. There was only one outcome of this: gradual loss of hearing, and, in pronounced cases, even total deafness. Today New York cab drivers who ply in the most congested areas of the city where there is a constant blare of auto horns, are becoming hard of hearing.

Occupational deafness is becoming more and more common, and as our cities are becoming noisier, there is an increase in occupational deafness among printers, bus drivers, road makers and traffic policemen. Not only does the continual pressure of strident sounds to which these workers are subjected tend to produce impairment in hearing, but there is also a strain on the nervous system which leads to neurasthenia and other ills.

Street noises are, for the most part, non-rhythmical, and the ear cannot be adjusted to them very readily. This gives rise to anger and other disturbing emotions. This is one of the reasons for the dire effects of noise on the delicately attuned nervous system.

It has been noted that there has been a decline in the birth rate in all civilized countries coincident with the machine age. The birth rate in England and Wales was 26.2 per 1000 in 1877; in 1928 it was only 16.7. From similar high rates in the United States, it fell to 18.2; in France to 18.4; in Germany to 18.6. Wherever machine civilization with its noise is not a factor, the rates have remained high. In Ceylon in 1928 the rate was 40, and in Egypt it was 43.3. Students of the noise problem have assigned to noise a very important part in causing this decline.

The rising incidence of mental disease noted in all civilized countries in recent years is even more serious than the declining birth rate. In this country the inmates in the institutions outnumber those in hospitals for all other causes. It is not an exaggeration at all to say that quite a few cases of insanity are caused by nervous systems which cannot adjust themselves to the constant bombardment of noise.

Edison said that city noises must inevitably grow greater and that the man of the future will be deaf. Without accepting this pessimistic doctrine, we must recognize the fact that the noises of the civilized world are steadily on the increase. Not only are new machines being made daily, with a consequent increase of incidental noises, but machines are even devised and are coming into use which make the increase and magnification of sound their main purpose. Such is the price of this noisy civilization.

All city noises range in intensity from 45 to 75 decibels, and it is this range which plays havoc with almost all human functions. The problem is one which demands the attention of engineers, and already some good results are in evidence. It is being realized in some quarters that noise in machinery means inefficiency. Automotive engineers particularly seem to realize this, as do also the makers of typewriters. Noiseless typewriters add to efficiency in business. The automobile manufacturers have succeeded in eliminating gear clash and the noisy second gear. Aviation engineering has devised sound-proof cabins so that the passengers will not be annoyed by the constant roar of the motors.

Other heartening advances along this line are the insulating materials to deaden street noises which modern architects are embodying in the construction of the modern home. Air conditioning apparatus and noise eliminating devices are becoming popular in all large noise-saturated cities. It is doubtful, however, if noise will ever be completely eliminated. It may perhaps be possible to tone noises down to ranges where they will have no harmful effects. This will be a great achievement when it shall finally have been done.*

The person who has to earn his living in noisy surroundings should always live in the quiet retreats of the suburbs or in some strictly residential neighborhood where there is a minimum of noise. Vacations should be spent in the country. Periodical absences from noise-laden surroundings will accomplish wonders in a great many cases of neurasthenia and even psychasthenia. The noise problem is one of the greatest in these swift times of ours.

Medical Service Statistics

— Standard Oil's Ten-Year Review —

DR. ROBERT COLLIER PAGE, Assistant Medical Director, Standard Oil Company (New Jersey) — recently commissioned Captain in the Medical Air Corps and assigned to the Air Surgeon's office, Washington, D. C.—in *Medical Bulletin*, September, 1942, has a 10-year review (1932-1941) of the vital statistics of the medical services of Standard Oil Company (New Jersey) and Affiliated Companies. The review is exhaustive in detail, complete in coverage and effectively illustrated by means of tables and unusually comprehensive graphic charts. The conclusions of the 10-year analysis, together with the tabular summary, are as follows:

STATISTICAL SUMMARY BY COMPANIES**—EMPLOYEES ONLY
Average Rates* for Period 1932 - 1941

	Average Number of Employees	Frequency Rates* Sickness and Non-Ind. Total	Ind. Injuries	Non-Effective Rates (*)	Death Rates (*)
UNITED STATES	28,688	460.31	447.02	13.29	15.24	3.80
Refineries:						
Bayonne incl. Eagle	3,788	281.79	276.75	5.04	13.88	6.65
Bayway	3,979	391.23	383.89	7.34	16.25	3.95
Baltimore	953	415.96	408.08	7.88	16.87	4.41
Baton Rouge	3,922	491.60	485.43	6.17	18.33	5.02
Producing & Pipe Line:						
Carter Oil Co.	1,662	464.21	438.76	25.45	13.42	1.74
Louisiana Producing	577	500.78	477.72	23.06	16.94	3.47
Louisiana Pipe Line ♯	544	796.81	741.47	55.34	21.48	3.06
Oklahoma Pipe Line Co. @	354	449.55	437.85	11.70	16.84	2.42
Sales:						
New Jersey Sales	1,696	405.27	369.42	35.85	13.81	2.54
Louisiana Sales	1,177	687.93	663.04	24.89	18.71	3.48
Natural Gas Cos.	4,446	467.73	458.10	9.63	12.81	2.18
Gilbert and Barker	1,192	266.35	260.31	6.04	12.70	4.11
Colonial Beacon Oil	1,798	403.34	380.47	22.87	12.74	2.89
EUROPE♦	8,297	429.23	289.16	40.07	17.08	3.49
TROPICS	29,543	391.48	340.07	51.41	10.41	3.30
Tropical Oil Co.	3,301	454.45	409.44	45.01	11.26	3.42
International Pet. Co.	4,243	222.04	182.18	39.86	6.13	2.92
S. O. Venezuela	3,354	632.02	517.65	114.37	18.69	4.68
Andian National Corp.	925	393.49	320.93	72.56	10.99	2.27
N. K. P. M.	5,379	302.99	280.18	22.81	7.89	2.64
S. O. Argentina	929	440.88	349.34	91.54	13.59	4.95
Lago Oil & Transport	3,624	325.00	300.97	24.03	7.48	2.18
Lago Petroleum Corp.	2,763	279.89	209.43	70.46	7.73	4.20
GRAND TOTAL	63,209	425.70	392.48	33.22	13.13	3.55

♦ Based on six years.
@ Seven years experience available.
♯ Nine years experience available.

* Per 1,000 per annum.
** Selected companies for which complete data are available for period considered in this review.

THE population served shows a gradual annual increase. The total employee population served increased steadily from 1932 through 1938, since which time there has been a sharp decline. The numbers of employees' families and "others" served shows an annual increase.

2. The absolute number of disability cases shows an almost constant annual increase, both among domestic and tropical employees. The number of disability cases occurring among employees' families and "others" who receive medical attention by staff physicians likewise denotes a

*It is probable that a beginning along these lines has been made with the development of several noise-reducing devices which are on the market. Notable among these are the Flents Anti-Noise Ear Stopples (Flents Products Co., Inc.), and the Knudsen Ear Defenders (Mine Safety Appliances Company).

yearly increase. The number of industrial accidents occurring in domestic fields has been practically constant while the number occurring in the tropics, has been variable and, by comparison, greater in number.

3. The total number of non-losing time cases treated in the dispensary increased yearly from 1932 to 1941. Since 1939, the number of employees requiring this service has shown a slight decrease; the number of employees' families and "others," on the other hand, has increased steadily each year since 1932.

4. There has been a steady rise in hospital admissions. In 1932 the actual number was 7,302 while in 1941, the figure was 18,990. Since 1938, the number of employees in the tropics requiring hospitalization has slightly decreased whereas the number of employees' families and "others" hospitalized at Company expense has increased steadily since 1932.

5. In Company owned hospitals there has been a sharp annual increase in the number of operations performed among each group through 1939, the increase being particularly marked among the employees' families and "others" group. Since this time, the absolute number has remained fairly constant.

6. The actual days of disability per case shows a gradual decrease over the period under review.

7. The days of disability per employee denote a slight annual increase for all employees who are considered in this review.

8. The non-effective rate for lost time disability denotes a gradual total increase, this increase being most pronounced among domestic employees.

9. For the last 10 years, the trend of employee disability frequency rates has been steadily upward. In the tropics this has been gradual but continuous while in the United States there has been a sharp upward trend since 1939.

10. The 10-year mean disability frequency rate for foreign employees residing in the tropics is 394.99, as compared to 447.02 for employees who are working in the United States.

11. Occupational diseases and absences resulting from industrial accidents require a minimal amount of medical attention and supervision as compared to non-industrial disability cases.

12. The outstanding conditions causing sickness disability in the United States according to their frequency are: (a) the common cold and influenza, (b) minor gastro-intestinal diseases, (c) complaints of neuromuscular-skeletal system.

13. The outstanding conditions causing sickness disability in the tropics according to their frequency are: (a) malaria, (b) influenza and the common cold, (c) minor gastro-intestinal diseases.

14. The frequency of amebiasis should show an annual increase with the increasing proficiency of laboratory technique; the lost time disability will, however, be proportionately reduced.

15. Tuberculosis can no longer be considered a major medical problem in so far as our interests are concerned. The rigid pre-employment physical examination which is required has undoubtedly played a significant role in this regard.

16. Smallpox, typhoid and paratyphoid fever as a cause of sickness disability have practically been eliminated by routine prophylaxis.

17. Venereal diseases present a perplexing problem, particularly in tropical countries.

18. Cardiovascular diseases are assuming a major role as a cause of long period sickness disability, particularly in the United States.

19. The actual number of deaths occurring among employees for the 10-year period under review shows an almost steady favorable decrease. Cardiovascular diseases are the most outstanding cause of death in the United States. The high death rate in the tropics among the employees' families and "others" is due to the high infant mortality among the national population.

20. The facts ascertained and incorporated in the foregoing remarks together with the results obtained by their correct utilization present sufficient evidence to merit the continuance of annual statistical analyses.

Work, Regardless . . .

—Handicapped, but Capable—

CATERPILLAR Tractor Co., Peoria, Illinois, has adopted the policy of hiring men who have become handicapped, and finds them capable employees. These men are replacing those who have joined the armed forces, and releasing other handicapped employees for other jobs in the plant. Typical are the men pictured on this page and described, left to right in sequence, as follows:

LLOYD SMITH, clerk in Caterpillar's Reclamation Department, lost his right arm eight years ago when accidentally shot by a hunting companion. After the accident he completed his high school education and learned to write with his left hand. He was formerly employed as a janitor and a watchman.

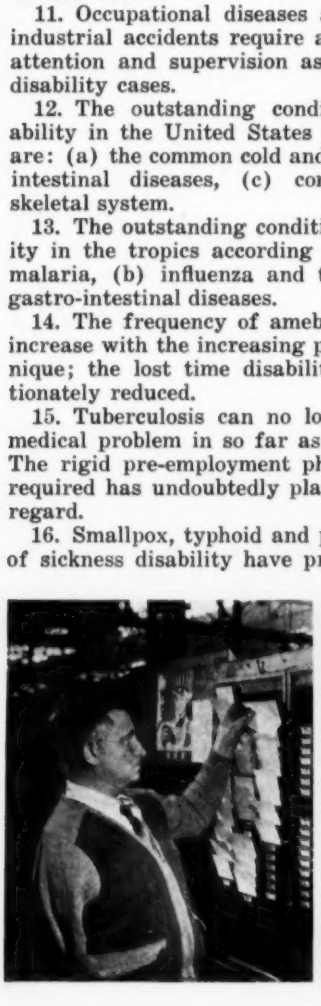
He's happy to provide home front backing for a brother with the Marines.

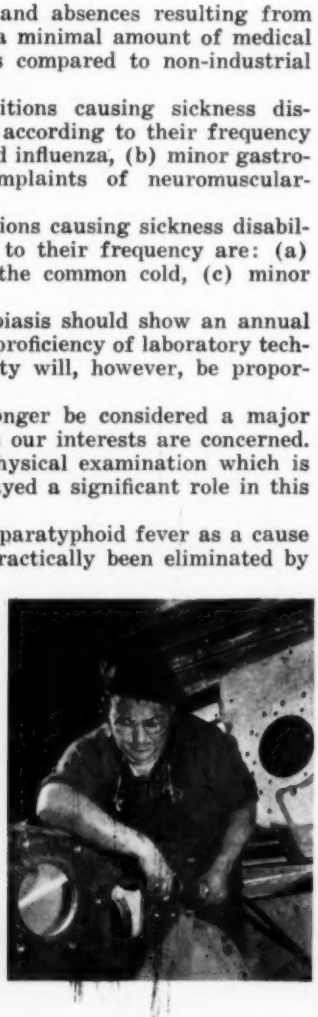
RUSSELL THRASHER, who suffered an attack of infantile paralysis at the age of three, wears a brace on his right leg, which does not interfere with his job at Caterpillar, where he is employed on hand tapping, hand reaming and small air grinder burring operations on tractor transmissions. He was formerly a taxicab operator and oil station attendant.

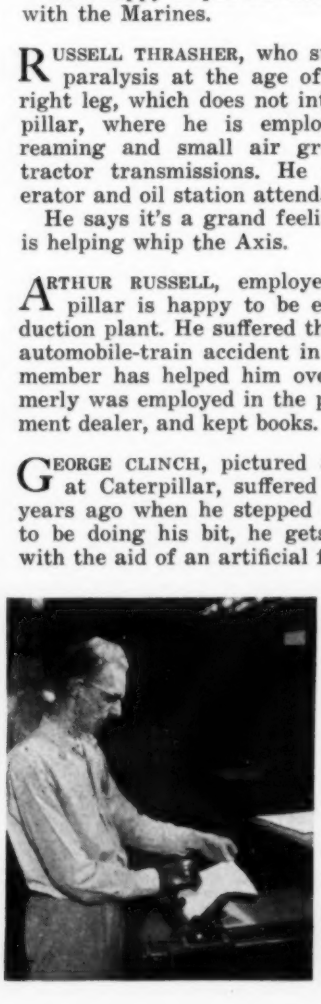
He says it's a grand feeling to work on material which is helping whip the Axis.

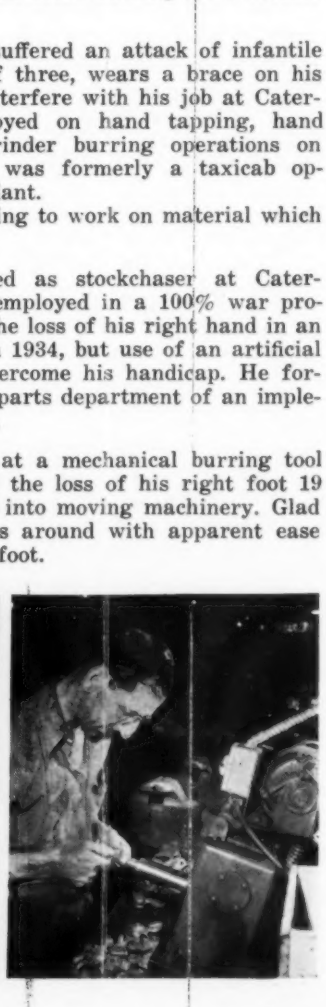
ARTHUR RUSSELL, employed as stockchaser at Caterpillar is happy to be employed in a 100% war production plant. He suffered the loss of his right hand in an automobile-train accident in 1934, but use of an artificial member has helped him overcome his handicap. He formerly was employed in the parts department of an implement dealer, and kept books.

GEORGE CLINCH, pictured at a mechanical burring tool at Caterpillar, suffered the loss of his right foot 19 years ago when he stepped into moving machinery. Glad to be doing his bit, he gets around with apparent ease with the aid of an artificial foot.









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Volume 11 DECEMBER, 1942 Number 12

Star in the Heart

THE shepherds on the hills beheld a flaming star, and heard the angel's singing. Far off East the Wise Men saw the star, knew it for a portent, and set about the journey that brought them into His presence of whom the angels sang. And the Wise Men, homing, carried with them the certainty of prophecies fulfilled from ancient days, and the sense of a newer prophecy against the days to come—the world henceforth would know the kindlier orthodoxy of "peace, good-will toward men."

And the world has known, regardless. Even now, in the midst of the havoc and devastation of total war, the spirit of Christmas lives undimmed. Through the seethings of hate the birthday of the Prince of Peace insists upon itself, despite that half the world must hail its coming only in their hearts, remembering its meaning from their better years.

For countless millions now on earth this Christmas won't be merry. In the conquered countries it will be only another day, unmarked, unsung, excepting as it accentuates the miseries of Satan's impositions. In the lands where it can still be celebrated, the empty chairs will sadden and subdue, the absences bring tears and husky voices.

But it *will* be Christmas. It will be a day with more of spirit as it has less of purse, more of hope as it is deprived of fulfillment, more of prayer as it is depended upon for promise.

The star has not yet set, nor shall it ever. The time will come when other Wise Men, seeing the star in new brilliance, will journey to behold the symbol become the substance, and witness on this earth the verity of "peace, good-will toward men."

'Til then—the Christmas prayer that the bound shall be free, the absent return, the ways of justice re-established, the paths of peace reopened to the feet of kindliness!

And 'til then—the between-Christmases *daily* patience, *daily* wisdom and *daily* work which alone can make that prayer this Christmas evolve its answer in the eventuality of a Merry Christmas to come!

Buy Bonds — or Else . . .

DEPOSITS of United States banks are at a new all-time high. Deposits of member banks of the Federal Reserve System rose *another* $208,000,000 during the week ended October 28, reaching a new all-time peak of $28,639,000,000, or $4,381,000,000 more than a year ago.

The four-billion bond issue of the Treasury during October, 1942, was taken up with a one-hundred-million oversubscription. This was done only after the Treasury had begged the banks to increase their purchases; and the Federal Reserve had to help out with heavy commitments. In December comes another large bond issue of about nine billion by the Treasury. *Everyone* must help to buy these bonds, or the cost of this war will be further increased. Probably with the strain of getting the October financing accomplished, the increased cost will already have come about, by the Treasury increasing the interest rate on the December offering.

The publicized request for deduction of 10% of income to be spent for war bonds applies to all of us—wage earners, physicians, surgeons, lawyers, storekeepers, capitalists, laborers, etc. But an increase above the amount of this 10% for people of the middle class is not only desirable but *necessary* as well. The 10% is primarily for the wage earners and salaried workers, especially for those who ordinarily do not save, but only spend. The response to this 10% request by entire employee forces in many employment situations large and small is so widespread as to be most gratifying. However, there are extensive groups who have never practiced saving; who live for and by the loan sharks; who spend unwisely and do not receive value for their money; or whose income has been chronically insufficient so that there is no backlog for ordinary necessities. If these people go on a purchasing spree with their present larger earnings instead of buying bonds, they increase the pressure on the price ceilings and thereby enhance the danger of an inflationary movement. As a matter of fact this has already occurred. Department store sales have increased remarkably, and soon, as another sequel, we will have meat and other rationing.

We on the professional level are of the numerous and powerful middle class, the people who have saved and know how to save. We include in our numbers everyone—from laborer to executive—who has investments in home, stocks, bonds or real or personal property. We of this middle class are the people who are going to pay for this war. The so-called wealthy class haven't enough money to pay for more than a few days of it, even if their entire wealth were confiscated. The term "middle-class" is used without any emphasis on or complacency in "class-consciousness." It is factual, and descriptive of all of us who are in the middle, and who, when great forces get out of control, are squeezed the most. *We're* going to pay—heavily and bitterly, if inflation runs away; heavily enough, but willingly and

sensibly, if we do what we ought to do and head it off.

Why not start now? Why not begin today, instead of letting this 28 billion inflationary peak rise higher, to be so expensively cut down some time in the future? The excess bank deposits are the inflationary bomb. Already they are four billion more than last year; four billion, and going to five billion shortly. This four billion is now on top of the badly inflated economy existing in 1941. *Everything* must be done to stop this spiral. It isn't money already in stocks and bonds that causes inflation. It is money on deposit in the banks, in those deposits with which the banks are doing patriotic work by purchasing bonds that should be bought by us depositors. If most of this purchasing were done out of our own pockets as private citizens or out of cash reserves which have been set up for ourselves, the situation would not be bad. The borrowing of this type of money by the government adds nothing to the country's money supply. The government borrows it, spends it, borrows it again, spends it again, and so on —to the end of the need.

That, however, is not what is actually happening. Instead, the government is selling its bonds to the banks—a process which pumps new money into the economy. Consider all the banks of the nation as though they were one. When you draw out $1000 from the bank to buy war bonds, the total of the bank's deposits goes down $1000. The bank temporarily has $1000 less in deposits. The government, however, spends the $1000 for materials and services, and it is re-deposited in the bank whereupon the total deposits of the bank return to the original amount. However, when the bank buys $1000 of war bonds, *with your deposited money,* the government spends the money and it is re-deposited in the bank and the total deposits of the bank have increased $1000. There is your inflation potential!

Go now to your own bank. Ask them to give you the figure of the individual deposits for 1941 and 1942. If the latter is greater than 1941, you and your community are behind on your war bond buying effort. Don't wait for the next fellow to buy. We—all of us—must go to work on this economic cancer immediately. Reappraise your cash reserve. Isn't it too high? We—all of us—will have to buy four billions in war bonds now to make us even with the first of the coming year. It is within our power to change this state of affairs. Let's do it, and save ourselves—lest we find too soon that, as professional people, part of the numerous and powerful middle class, we are just as numerous but not anywhere near as powerful.

AS DR. LEGGO has indicated (INDUSTRIAL MEDICINE, October, p. 481), one of the more serious problems of the times is a result of the impact of the war emergency on industrial medicine, in such respects as where it becomes necessary to function "with less well-trained help" and with technicians and aides as replacements for more skilled people. This problem will be given special consideration at one of the sessions of the fifth annual Congress on Industrial Health, sponsored by the A. M. A. Council on Industrial Health, to be held Monday to Wednesday, January 11-13, 1943, at the Palmer House, Chicago. The meetings of the Congress are open to physicians and others interested in industrial health.

THERMALS and DOWN-DRAFTS

APROPOS of the opening article in this issue is the following from a play by W. Shakespeare:

Cassius. But, soft, I pray you: what, did CAESAR swound?
Casca. He fell down in the market-place and foamed at mouth and was speechless.
Brutus. 'Tis very like: he hath the falling sickness.

Regarding the number thus afflicted, the authors of the article above mentioned put it at "approximately 350,000." In his description of the Auracraft Shop, in Cleveland, Dr. Joseph L. Fetterman refers to the estimate of W. G. Lennox (Science and Seizures, Harper & Bros., 1941) that "there are some half million in the United States." In "Epilepsy in Childhood" (*Wisconsin M. J.*, November, 1942) Dr. M. G. Peterman, of Milwaukee, says: "It is estimated that one half of 1% of the population suffers from active epilepsy. This makes a large group of about 650,000 individuals in the United States who suffer from this disease." Whatever the total, it is too great a number to be left in idleness now, or in discouragement ever. There is strong medical opinion to the effect that the best possible work for these people is found on the farms. And farm work is said to be the kind of work that most of them can do best. Something for the manpower economists to think about!

THE War Manpower Director utters the profound observation that "You can't ration sickness." The Vice-President pontificates that good health is a "fundamental democratic right" yearned for by all the people, although they have not yet found a way to demand it. And he continues: "Society has not completely fulfilled its obligation to our people when it gives them decent wages and incomes, the highest possible standard of living and security in their jobs and their homes. Our people want also to be strong, vigorous, and healthy in mind and body. When democracy is strengthened by this most fundamental right, then at last we shall have the benefit of the people's best efforts in governing themselves." All of which is another way of saying that you *can* ration health—the "you," of course, being another government bureau. Oracular profundities of this kind are common in high places. Not often, however, are they as well compounded of dynamite and opium as the foregoing. The danger is that it requires a little thought to discover the stinger; and the oracles are well aware that most of those who hear and read their utterances don't like to think, and that a little flattery, artfully placed, will make them not want to think. There's a purpose in the phrasing; every word is carefully weighed with that purpose in mind. It is interesting to note that in Great Britain, where a similar purpose has been under way, a recent conference of "doctors from all parts of the Kingdom," meeting under the auspices of the British Medical Association, "views with grave concern the great increase in minor illnesses among the insured population."

WELL merited, indeed, are the many favorable press comments on the intensive post-graduate course in industrial medicine given last month at Long Island College of Medicine. The superlative quality of the presentations is obvious from the lecture texts appearing in these pages. Typical of the comments is the following, in *New York Herald Tribune,* November 24: "The first course—Long Island College hopes to repeat it next semester—was given to 59 physicians, nurses and industrial observers. Enrollees from such companies as Bethlehem Steel, Hercules Powder, Lockheed Aircraft, Sperry Gyroscope and Todd Shipyards attested the interest of the industries themselves in the project. One physician went directly from the course to a war firm, five to a month's 'internship' in the actual field. The college has received inquiries about the course from other schools of medicine and medical societies, suggesting that where it has pioneered others may follow. Training of doctors and nurses for industrial service is a needed contribution to organization for war. The number of workers in war plants has tripled within the year . . ."

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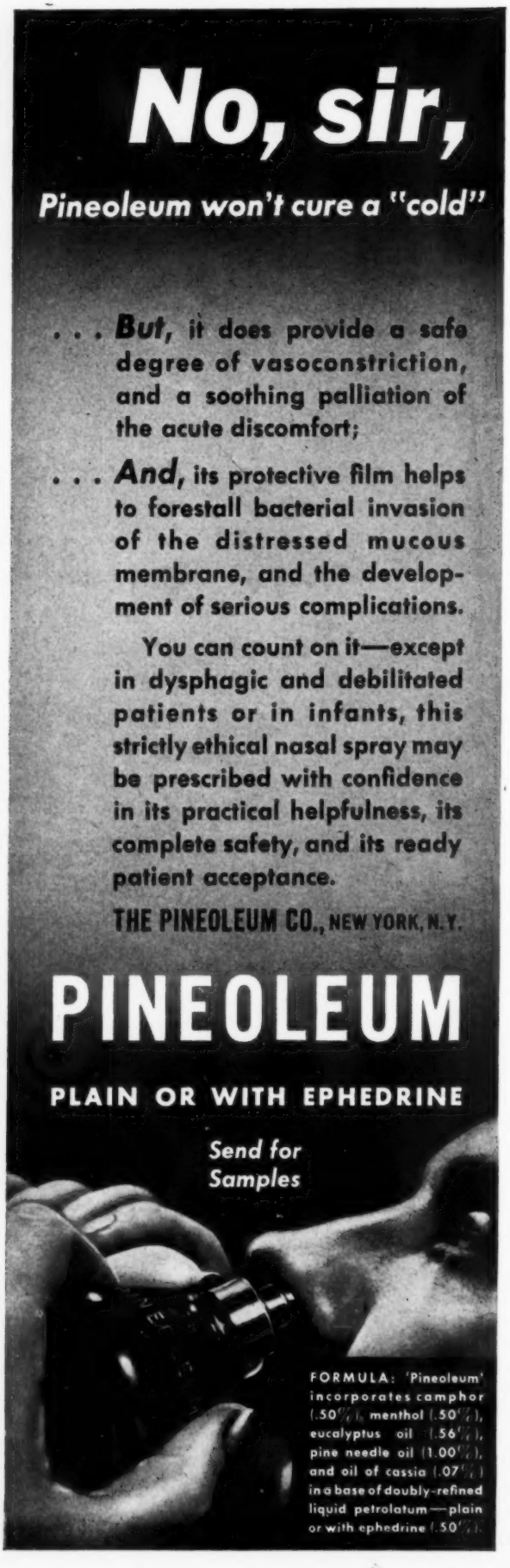
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An Appraisal of Industrial Medical Facilities in Lycoming County

WILLIAM S. JOHNSON,
Industrial Hygiene Engineer,
Pennsylvania Department of Health

AT THE request of the Lycoming County Medical Society, a survey of the medical facilities of all industries in the county employing more than 25 people has been made by the Bureau of Industrial Hygiene, Pennsylvania Department of Health. The purpose of the survey was to show the need for organized medical programs in local industries in addition to providing the County Medical Society with information which could be used in the development of integrated medical programs which might be offered to industries in the locality. The following data are gleaned from the recapitulation of that survey, and embody information received from 64 plants in the city of Williamsport and its environs.

Out of the 64 plants, 26 plants, or 40%, employ under 50 people. Ten plants, or 15%, employ from 50 to 100 people. Eleven plants, or 17%, employ from 101 to 200 people. Six plants, or 9%, employ 201 to 300 people. Three plants, or 4%, employ from 301 to 400 people. Two plants, or 3%, employ 501 to 700 people. Three plants, or 4%, employ from 701 to 900 people, and three plants, or 4%, employ 901 or more people.

The plants were divided into the following industrial classifications, the numbers following each classification indicating the number of plants in that category:

Chemicals and allied products	1
Clay, glass, and stone	3
Food and kindred products	3
Leather and rubber products	9
Lumber and its remanufacture	9
Metal and metal products	9
Paper and printing industries	5
Textile industries	14
Laundries and allied industries	4
Utilities other than railroads	6

The survey does not include any figures for any of the railroads nor the Pennsylvania Ordnance Works. The 64 industries surveyed employ 14,560 people and the medical departments treated 53,206 cases in the past year. This figure includes pre-employment examinations, periodic examinations, first dressings, re-dressings, and the examination of absentees upon returning to work after an absence caused by illness. Of the 53,206 cases, 48,856 are from the three largest industries in the city, in which industries there is an integrated medical program. The remaining cases, or 4350, are the number of cases seen by the medical departments of 61 other plants in the city; and it is, of course, to these plants that any program which this group sponsors will have to apply.

Of the 64 plants in question, one employs a full-time physician; two employ part-time physicians who spend an average of two hours a day in the plants; 39 plants, or 60%, have physicians on call only. In most cases, this is not limited to only one physician, but rather a group of three or four.

Twenty-two plants, or 34%, have no physician on call and it is the practice here, in case of accident, to send the patient to a physician of his own choice. Four plants have full-time nursing service varying from one nurse serving an eight-hour shift to nine serving eight-hour shifts on a 24-hour basis. One company through its insurance program has available to it the part-time service of that insurance company's nurses. In the remaining 59 plants, or 90% of the total, there is no nursing service whatever.

The type of medical service offered under existing programs is as follows: 18 plants, or 28% of the total, require pre-employment medical examination; 12 plants, or 18%, perform periodic physical examinations, one of these doing such examinations once a year on each employee, and the remaining 11 doing periodic examinations when indicated and only on such employees as indicated. Forty-

The Pennsylvania Medical Journal, November, quoting Lycoming County Medical Society's *Medical Bulletin*, October, 1942.

five plants, or 70% of the total, treat only compensable accident cases. Thirty per cent of the plants, in addition to treating compensable accident cases, also provide treatment for emergency illnesses. In five plants, or 7% of the total, the company physicians periodically inspect the plants for the presence of occupational disease hazards and general sanitary conditions.

The cost of such services varies greatly—from as little as $5.00 a year in one plant to thousands of dollars a year. More than $44,431.07 was spent by the surveyed industries in the year 1941 for medical services. Of this amount, $36,743.07 was spent by the three companies with integrated medical programs. The remaining 61 plants employing 9320 people spent $7,688, or an average cost of $1.74 per case. This represents an expenditure of 82 cents per employee per year as compared to expenditures of $10.18, $6.00, and $5.82 per employee per year for the three companies having medical programs. When it is known that 52 cents, 80 cents, and $1.42 are the respective costs per case in the three companies having integrated programs, the figure of $1.74 per case for those industries having no medical program becomes significant; and when it is realized that if the costs of the afore-mentioned three companies are included, the average cost per case in the city is only 83 cents and that there is spent on each employee per year a sum of $3.21 for medical services, the need for the formation of some organized medical program for small industries is apparent.

In addition to surveying the medical facilities, information was secured on the welfare activities of these plants. It was found that 15 plants, or 23%, have some form of a sick benefit association. Of these, 12 are supported by the employees alone and three by company and employees together. An average of 80% of the employees in these industries having such associations are members. The cost to the employee is, in all cases, a small sum. Three of the companies having such associations report that the benefits are used to pay medical expenses alone, and it must be assumed therefore that the members of the 12 remaining associations use the benefits for purposes other than payment for medical services. The amount of the benefits varies from full pay with only a two-day waiting period for an indefinite length of time as a maximum to $5.00 weekly for only 10 weeks after a seven-day waiting period. The average payment is about $11 a week for an average duration of 13 weeks, and in all plants but one is payable after a waiting period of seven days. Each plan has additional features, some of which might be mentioned: for example, 90 days at one-half pay after an illness of 21 days' duration; 52 weeks at one-half pay after a sickness of 13 weeks' duration; death benefits vary from $50 to $1,000 in individual cases.

Twenty-one companies, or 35% of the total, have hospitalization plans. Of these, five use the well-known Blue Cross plan which need not be described. The remaining 16 use plans sponsored by various insurance companies selling group insurance. The cost varies from 50 cents to $1.00 per month in 17 plants and from $1.00 to $1.50 a month in the other four plants. Approximately 70% of the employees of companies having hospitalization plans participate in these plans.

As was said before, no description need be made of the Blue Cross plan, but of the remaining plans, the benefits average as follows: $4.00 a day for 60 days in addition to an average laboratory and operating room fee of $20, and surgical fees up to $150.

Because nutrition is an important part of any public health program, it seemed important for us to determine the extent of lunch facilities in the plants. Three of the 64 plants maintain cafeterias, one being company-operated and the other two operated by private concessionaires. Particularly significant was the fact that in only four of the companies were the workers forbidden from eating in the workrooms. The length of the lunch period is also important from a nutritional standpoint. It was found that the average lunch period in 24 of the plants is one-half hour, and in five plants three-quarters of an hour is allowed. One hour lunch periods exist in 33 plants. Two plants have no lunch hour, the employees eating whenever possible.

Twenty-four companies, or 36% of the total, use educa-

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tional posters supplied by such agencies as the U. S. Public Health Service, State Department of Health, the National Safety Council, and other agencies interested in health and safety. Nine companies indicated their willingness to have health talks made by physicians in their plants. Eight plant managements were agreeable to the presentation of health "movies" in their plants. Four plants expressed their interest in a plan for reporting industrial absenteeism for the preparation of morbidity statistics. Twenty-three of the surveyed plants have had or have requested industrial hygiene surveys of their plants. Three companies have venereal disease control programs, but limit them to pre-employment Wassermann tests. When queried on what was done with accident cases, 50 plants replied that cases were sent to the hospital or to the doctor immediately, while the remaining 14 reported that such cases are treated before being sent out. Fifty-three plants maintain first-aid cabinets. Of the remaining 11 plants, eight are without any first-aid facilities. In 47 of the plants organized first-aid instruction has been given.

The foregoing discussion has dealt with those industries situated in Williamsport and its environs. Outside of this group of industries, there are 15 plants in other towns of the county which employ a total of 1012 persons. These plants were included in the survey and they can be dealt with briefly because the pattern set by the city plants is closely followed by the other plants in the county.

As for costs, the county plants apparently do not spend the amount on medical services as do the city plants. The cost per case in the county plants is only 43 cents as compared to 83 cents per case for the city plants. The cost per employee per year in the county is only $2.56, while in the city plants the corresponding figure is $3.21.

Digressing for a moment from our own local problem, I would like to cite the results of a survey made in 1934 by the American College of Surgeons of 334 industries employing 733,261 persons. It was found that an average cost per employee per year for medical services was $6.30, ranging from $2.72 in the leather industry to $17.69 in the mining industry. It, therefore, appears that Lycoming County industries are somewhat below the average for industry in general. Further findings of the national survey showed that, for small plants, medical costs and compensation costs, were about equal. This, I am sure, is not the case in Lycoming County—the compensation cost is, to the best of my knowledge, the higher one.

In relation to welfare services, it might be said that city and county plants are alike, that is, about 20% of each have welfare programs.

BOOKS

War Gases

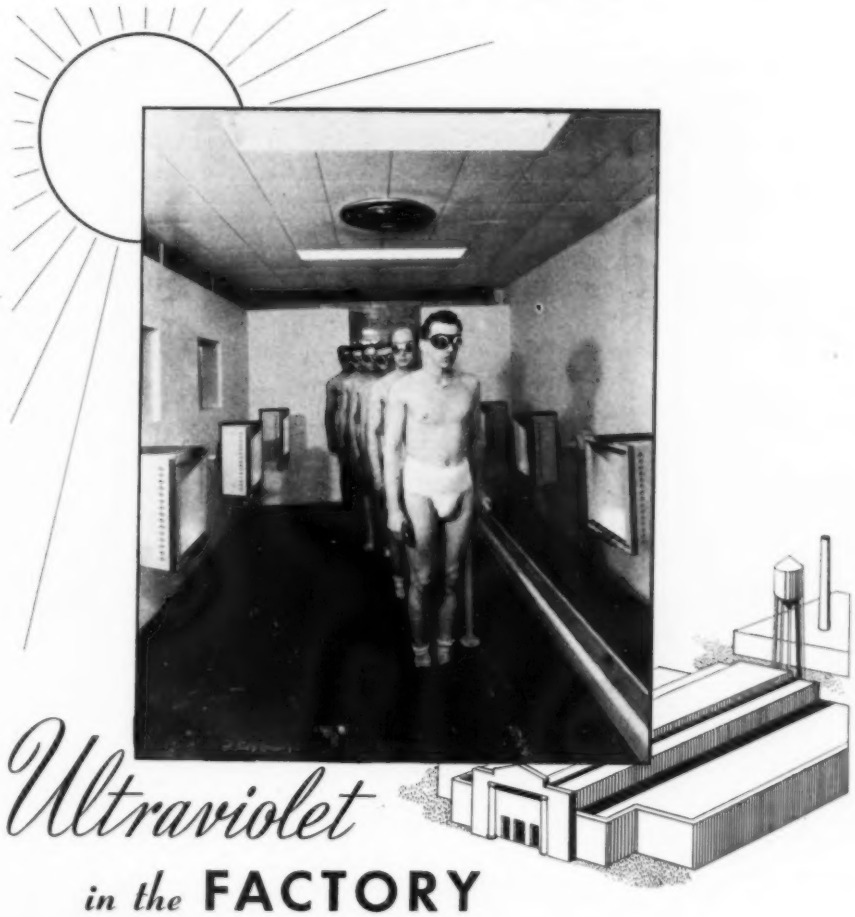
Review by
C. S. MOLLOHAN,
Lieut.-Colonel, Medical Corps

WAR GASES: THEIR IDENTIFICATION AND DECONTAMINATION. By MORRIS B. JACOBS, PH.D. Cloth. Price, $3.00. Pp. 180, with eight illustrations. New York: Interscience Publishers, Inc., 1942.

IN THE author's preface, he defines the aim of this book as the presentation, in useful form, of information on the detection, sampling and identification of chemical warfare agents, and the decontamination of areas and materials polluted by them. It is in connection with the last-named problems that the book finds its greatest value.

The introduction emphasizes the necessity of thorough preparation to meet gas attacks, points out the danger of complacency which has arisen in many quarters because of the infrequent employment of gas in World War II to date, and disposes of many of the unwarranted fears which have only served to enhance the panic-spreading effect of chemical attacks.

After dealing with a brief definition of terms used in the discussion of chemical warfare agents, and touching adequately on the fundamental mathematics necessary for the calculation of atmospheric concentration, the author proceeds to a thorough discussion of the physical characteristics and physiological response of the war



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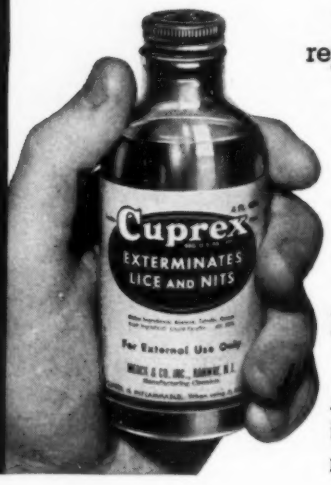

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gases. This section (Chapter II) is necessarily lengthy, covering a total of 37 noxious agents, not including the screening smokes and incendiaries. A number of the gases covered are probably of only minor importance, mainly because of tactical difficulties in their use, and this fact might have been pointed out more clearly, so that the reader could distinguish easily between the more and less important agents. The data on each gas are ample, and the chapter is well supplied with various comparative tables of strength, toxicity, and physiological responses to varying concentrations.

The ensuing part of the book is much more interesting and of greater value to the decontamination and gas treatment officer. The effects on various materials, water and food are dealt with tersely, and there is a brief section on sampling. This latter might well have been expanded, for the results of any analysis can only be as good as the sampling technique. The reader is frequently referred to the author's other text, "The Analytical Chemistry of Industrial Poisons, Hazards and Solvents," but the usefulness of the present volume would be enhanced by the inclusion of more precise information on the fundamentals of sampling. The actual sampling techniques themselves are given in detailed form as each gas is taken up in the discussion of field tests.

In the presentation of the scheme of analysis and the confirmatory tests (Chapters IV, V and VI), the author again presents the subject matter in great detail, and assists the reader with several good tables and well-chosen illustrations. The separate additional attention to the detection and determination of arsenic is a wise feature, considering the toxicity of this element and the extent to which it is employed.

Here again it might have been better had the author indicated which procedures were preferable or more easily performed.

The final chapter on decontamination is excellent, and is particularly important if dove-tailed with the plans for the tactical employment of a chemical unit. It may perhaps be somewhat out of the province of a Medical Gas Treatment Battalion, but it is extremely important information and well worth the time spent in reading.

Watch Lycoming County

THE proposed plan of industrial health for small plants in Lycoming County, Pennsylvania, as it appeared in *Pennsylvania Medical Journal*, was republished in INDUSTRIAL MEDICINE last month (page 557). Elsewhere (on page 598 herein) appears MR. JOHNSON'S "Appraisal of Industrial Medical Facilities" in that county; and following is *Pennsylvania Medical Journal's* editorial comment on another enterprise of the county medical society:

WE HAVE previously referred to the accomplishments along the line of industrial hygiene and health of the Lycoming County Medical Society working with the industries in that county largely through the Williamsport Community Trade Association. Indicative of the true objectives of such a program, we append the communication which will be addressed to the employees by any industries joining in the Lycoming County endeavor to establish industrial health conservation in the county's industries.

TO OUR EMPLOYEES:

In cooperation with the War Manpower Commission and medical organizations generally, we are instituting in this plant a new industrial health program designed particularly as a sickness-prevention measure to better control absenteeism, promote efficiency, and improve production.

It is not intended in any way to displace your own family-doctor relationships, as sickness treatment is not a part of the program, but it will include pre-employment examination, with the idea of better job placement, and a follow-up physical examination when indicated, together with a checkup following sickness absenteeism. It also will include plant hygiene, sanitary engineering measures, and health education, emphasizing the importance of proper nutrition and general healthful living. This program should react to your own better health, and we ask your respectful consideration and cooperation.

INDUSTRIAL HEALTH and DISEASE

Analyzing Working Environment

E. C. BARNES,
Industrial Hygiene Engineer,
Westinghouse Electric & Manufacturing Company

DURING the first six months of this year there was one case of lead poisoning involving loss of time from work. During this same period, 36 of the urine samples which were analyzed in the Industrial Hygiene Laboratory indicated lead exposures above normal, and shop investigations were conducted to determine if it would be possible to reduce these exposures. These 36 cases do not, in any way, indicate that the persons had lead poisoning; however, if the exposures had continued over a sufficiently long period of time, clinical cases of lead poisoning might have occurred. In each case, an investigation of the exposure was made. These cases were all brought to attention through the periodic physical examination program, and this indicates the need for such examinations.

When increased exposures are indicated by the determination of the urinary lead excretion, it is then possible to collect air samples and make an analysis of them for lead content to determine the nature of the exposure and recommend specific changes. Special chemical methods which have been developed especially for such determinations are used in the Industrial Hygiene Laboratory.

In Westinghouse *Safety News*, September, 1942.

Solvents

THE demand for better solvents in order to make better varnishes and paints, as well as the many substitutions which have been necessary because of the shortage of certain solvents, has created numerous problems. It appears that solvents which speed up processes and make better products tend to be more toxic and for this reason, there is a definite trend today toward the use of the more toxic solvents. The question of using more volatile solvents must also be taken into consideration since more rapid evaporation of a solvent will produce a higher concentration of it in the air.

As an example, benzol is finding greater use in many manufacturing operations today. It may be used as a substitute for other solvents which are less readily available, and we have also found that it is being used in solvent mixtures which are sold under various trade names. The determination of exposure to benzol can be made either by measurement of the vapor concentration in the air or by determination of the increase in organic sulphates in the urine of the exposed worker. By periodic determinations of urine sulphates, it is possible to determine the extent of exposure and insure safe working conditions.

Dust Counts

THE first work undertaken by the Industrial Hygiene Laboratory, in 1933, was the determination of dust in shop operations where there was exposure to silica dust. Since that time, many improvements have been made in the methods of determination, and their accuracy. In our laboratory an electrostatic dust and fume sampler has been developed, and this type of instrument is now used by many industrial laboratories throughout the country.

Through continual attention to the reduction of dust concentrations by our plant engineers, there has been a great reduction in the potential health hazard. Under present conditions of increased production, there is a tendency to minimize the possible hazard from dust exposures, since the effects of the dust do not show themselves immediately. This is a false sense of security and proper protective measures should be utilized wherever a hazard may exist.

Recent periodic physical examinations at one plant indicated that further study of the exposure of the workmen would be desirable. A number of dust samples were collected and the concentrations which were measured indicated both increased concentrations and the operations which needed further attention. Recommendations for these corrections have been made and additional samples will again be collected to determine whether the hazard has been satisfactorily eliminated.

Fluorides

IT IS only recently that sufficient basic information has been available to assess the possible hazard from the use of various compounds of fluorine in industrial operations. Extensive investigation of the reaction of fluorides in the body, and of different fluoride exposures by the Kettering Laboratory of Applied Physiology, and other such investigators, have indicated the approximate permissible for exposure and methods of measuring such exposure.

Fluorides are being used more extensively in industries today, and it is fortunate that we have proper information about the safe operating conditions. A recent study at one of our plants indicated that the worker's exposure to fluorides during certain welding operations was higher than desirable. Suitable ventilating equipment is being installed to reduce this potential health hazard.

In general, fluoride studies have not revealed unsafe conditions, but proper consideration should be given to such exposures.

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Data on Vitamin Deficiencies

WE HEAR a lot about "vitamin deficiency" but do you know just what happens to a person deficient in a certain vitamin or vitamins? The handy list below comes from the North Carolina Health Bulletin:

Vitamin A: Deficiency causes night blindness; rough, dry skin; low body resistance. Good sources are: Green leafy and yellow vegetables; all dairy products; liver; dried apricots; prunes; fish oils.

Vitamin B_1: Deficiency causes lack of appetite; general weakness; weak heart; loss of weight. Good sources are: Whole wheat and enriched bread; cereals; oranges, bananas and other fruits; milk; liver; pork; peas and beans.

Vitamin C: Deficiency causes pyorrhea; gum infections; dental cavities; scurvy; anemia. Good sources are: Fruits, especially citrus; tomatoes and most other vegetables.

The Trained Nurse and Hospital Review, November, 1942.

Vitamin D: Deficiency causes impaired formation and maintenance of teeth; bow legs; rickets. Good sources are: Fish liver oils; vitamin D milk; butter and enriched margarine; eggs; fish; sunshine.

Vitamin G: Deficiency causes sores in angles of mouth; burning eyelids; mild, greasy dandruff. Good sources are: Wheat germ and yeast; milk; cheese; liver; yellow, red and green vegetables; some fruits, especially dried apricots and prunes.

Nicotinic Acid: Deficiency causes pellagra; indigestion; diarrhea; insomnia; depression. Good sources are: Wheat germ; liver; cheese; red, yellow and green vegetables; dried apricots; prunes; eggs, lean beef; brewers' yeast; rice pudding.

Pennsylvania Post-Graduate

BEGINNING early in January a Post-graduate Course in Industrial Medicine and Hygiene is to be presented in Philadelphia under the auspices of the Committees on Industrial Health of the Philadelphia County Medical Society and the Medical Society of the State of Pennsylvania. The course is to be directed jointly by the Departments of Preventive Medicine and Public Health of the University of Pennsylvania, and the Women's Medical College of Pennsylvania, at the Philadelphia County Medical Society on the basis of the following tentative outline:

General Problems

TUESDAY, January 5, 1943. 4-6 P.M.
I. Organization and set-up of medical services in large plants.
II. Bringing health supervision to the small plant.
III. Keeping of records.*

The Worker on the Job

THURSDAY, January 7, 1943. 4-6 P.M.
Evaluating the Worker:
I. The pre-employment examination.*
  (a) Need for examination.
  (b) Scope of examination.
  (c) Classification on a physical health basis.
II. The neuro-psychiatric examination and tests:
  (a) Mental appraisal: special tests. Natural intelligence, trainability, adaptability to group activity.
  (b) Neurological evaluation. Muscular coordination. "Tempo" of the worker. Adjusting the neurologically handicapped.
III. Placement criteria.
IV. The periodic check-up.

SATURDAY, January 9, 1943. 4-6 P.M.
I. Factors influencing health and efficiency of worker.
  (a) Temperamental adaptability to work.
    1. Borderline mental hygiene cases.
    2. Worry, etc.
  (b) Socio-economic factors.
  (c) Racial factors.
  (d) Age and sex.
II. Minor illness and functional disturbances.
III. Absenteeism.

Learning the Scope of the Field

TUESDAY, January 12, 1943. 4-6 P.M.
I. Use of official surveys of industries or industrial areas to learn the hazards involved.
II. The plant survey and inspection.
  (a) Plant sanitation.
  (b) Process and general hazards and efficiency of preventive measures and their use.
  (c) Observing the worker "on the job."

THURSDAY, January 14, 1943. 4-6 P.M.
I. Correlated services engaged in health supervision.
Scope, limitations and interrelations of work of:
  (a) The personnel director.
  (b) The medical director.
  (c) The safety director.
  (d) The industrial nurse.
  (e) The social service worker.

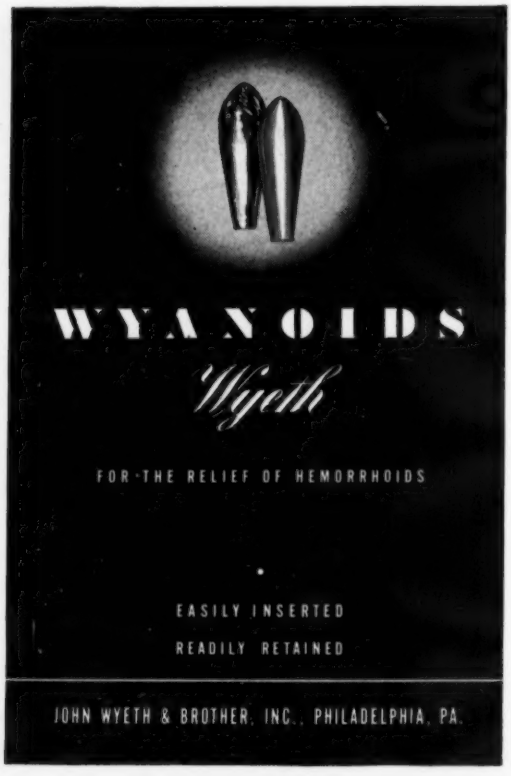
SATURDAY, January 16, 1943. 4-6 P.M.
I. Qualities of a good medical director.
II. Merging of non-medical interests in maintenance of health and efficiency of the worker.
  (a) Its value to management and production.
  (b) Organized labor's interest and cooperation.
  (c) The insurance underwriters' responsibilities.

Visits to large and small plants will be arranged for those wishing to see those services in action.

Physical Factors

TUESDAY, January 19, 1943. 4-6 P.M.
Physical Factors Affecting Health.
I. Effects of inadequate ventilation.
  (a) General effects.
  (b) Specific needs of industrial processes.
  (c) General methods of control.
II. Excess thermal hazards.
Heat prostration and "heat sickness."

*A display will be presented of recording and filing equipment and examination forms in use by several firms.



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(a) Industries where encountered.
(b) Preventive methods and control.
(c) Disability resulting.

III. Effects of noise and vibration.
(a) Industries where encountered.
(b) Preventive methods and control.
(c) Disability resulting

THURSDAY, January 21, 1943. 4-6 P.M.
Extremes of Air Pressures.
I. Caisson or tunnel disease, its causes, prevention and results.
II. Aviation hazards of altitude and cold.

SATURDAY, January 23, 1943. 4-6 P.M.
I. Fatigue in industry.
II. Nutrition in industry.

TUESDAY, January 26, 1943. 4-6 P.M.
I. General safety measures in accident prevention.
II. The work of national safety council.
III. Protective devices.

THURSDAY, January 28, 1943. 4-6 P.M.
I. Minor accidents and their care.
II. The first aid trained worker.
(a) Where he is of value.
(b) His limitations.
III. Burns and scalds.

SATURDAY, January 30, 1943. 4-6 P.M.
I. Fractures and crushing injuries.
II. Newer methods in traumatic surgery.
III. Rehabilitation of the injured.

TUESDAY, February 2, 1943. 4-6 P.M.
Non-Occupational Disease Hazards in Industry.
I. Venereal disease in industry.
II. Dermatitis and dermatoses in industry.
III. Carcinogenic substances used in industry:
Tar and compounds. Radium, x-ray.

THURSDAY, February 4, 1943. 4-6 P.M.
I. Upper respiratory infections and their effect on worker and work.
II. Hazards of exposure to the elements.
(a) Pneumonia.
(b) Rheumatism, neuritis, myositis.
(Extent, where encountered in industry, and now controlled.)
III. Cardiovascular conditions affecting and effected by industry. (Including alcoholism.)

SATURDAY, February 6, 1943. 4-6 P.M.
I. Tuberculosis in industry.
Dust hazards.
II. The pneumonconioses.
(a) Minor organic and inorganic dust hazards.
(b) Silica and silicates.
1. Asbestosis.
2. Silicosis and silica tuberculosis.
III. Dusty trades: Pottery making, granite cutting, sandblasting, etc.

TUESDAY, February 9, 1943. 4-6 P.M.
Toxicology:
I. General discussion of toxicology and classification of toxic substances on basis of absorption and reaction on the worker.
II. Metallic poisoning.*
(a) Lead:
1. Forms encountered in industry and their action.
2. Trades and processes where encountered.
3. Prevention and control measures.

THURSDAY, February 11, 1943. 4-6 P.M.
I. Metallic poisoning. (continued)*
(b) Chromium and cadmium.
(c) Mercury and zinc, etc.
(d) Selenium and vanadium.
(e) Manganese and magnesium.
(f) Antimony, copper and tin.
(g) Arsenic, etc.
II. Metallic fumes and gases.
III. (a) New use of these substances and their hazards.

* (Nature of action and injury.)
(Industries and processes involved.)
(Prevention and control.)

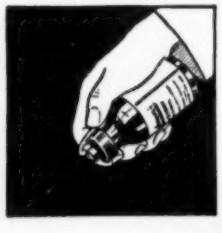
(b) Special processes causing metallic hazards. Welding, etc.
(c) Metal Fume Fever.

SATURDAY, February 13, 1943. 4-6 P.M.
I. Acids, alkalies, alcohols, esters, aldehydes, etc.
II. Vehicles, solvents, cleansors and degreasers.

TUESDAY, February 16, 1943. D-F P.M.
Some of the more hazardous industries:
I. Silicous trades — Pottery manufacing granite cutting, mining, sandblasting, etc.
II. Lead trade—Salts of lead, storage battery manufacturing, paints and rubber manufacturing, lead as an alloy, etc.
I. Neuro-psychiatry. (As applied to the (Benzol, benzine derivatives, degreasers, etc.
IV. New coatings, etc. (Enamels, ducos.)
V. Automotive Industries—Lead, coatings, welding, carbon monoxide.
VI. Synthetics—Plastics, textiles, etc.
VII. Manufacturing and use of insecticides and disinfectants.

THURSDAY, February 18, 1943. 4-6 P.M.
The Specialties in Industries:
I. Ophthalmology — eye hazards and preservation of sight.
II. Otology — vibration and noise, and preservation of hearing.
III. Neuro-psychiatry. (As applied to the individual worker.)
Early signs and diagnostic tests for accumulative toxic effects, etc.
IV. New aspects due to war:
(a) Tuberculosis, gynecology and obstetrics in women workers.
(b) Earlier tuberculosis, toxic effects, etc., in youth.

SATURDAY, February 20, 1943. 4-6 P.M.
I. Changes in industry due to war, presenting special hazards,
(a) General aspects in plant processes: Speeding-up; rapid turn-



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VII—Psychoses, and the Role of Trauma in their Causation
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IX—Traumatic Lesions of the Spine and Spinal Cord
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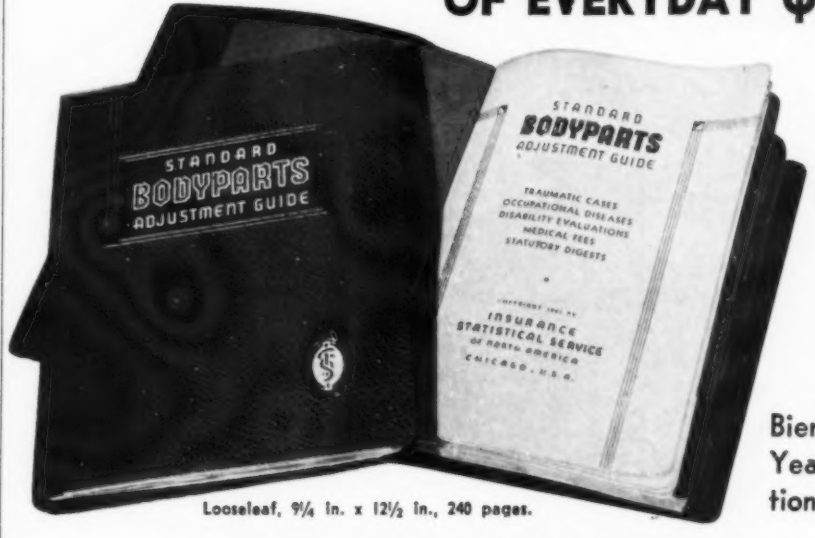

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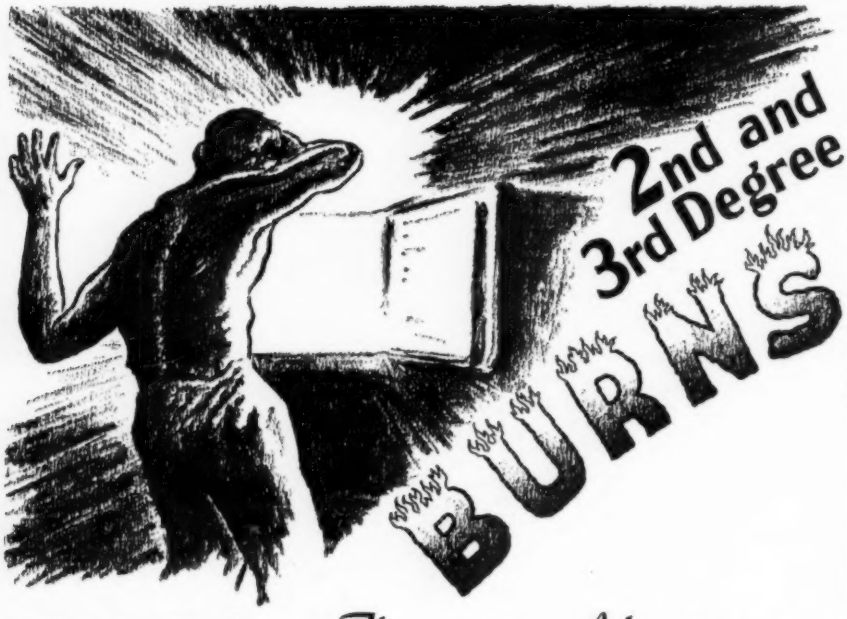

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over; overtime; continuous production; mixed personnel; special training, etc.

(b) Changing processes and practices affecting health; assembly line specialization and its effect on the worker; the three-shift day; mass production techniques; spray gun painting; electric welding, etc.

II. Special problems of new groups:
(a) The militarily unfit.
(b) The returning older worker.
(c) Women in industry.
(d) Safeguarding youth.

Compensation and Medicolegal Factors

TUESDAY, February 23, 1943. 4-6 P.M..
I. Extent and result of accident compensation.
II. Extent and trends in occupational disease compensation.

THURSDAY, February 25, 1943. 4-6 P.M.
I. The compensation boards.
II. The expert medical witness, his responsibilities and his limitations.
III. General medicolegal aspects.

SATURDAY, February 28, 1943. 4-6 P.M.
Orientation of Medical Efforts for Health Supervision in the Future.
I. The role of public health.
II. The private practitioner's responsibility and opportunity.
III. Organized medicine's role.
IV. Hospital and medical service insurance.

Central States Society

CENTRAL States Society of Industrial Medicine and Surgery is holding its mid-winter scientific session on Friday, December 11, 1942, at Chicago—with "War Surgery and Allied Subjects" as the session theme. The morning meeting convenes in the surgical amphitheatre of Cook County Hospital at 9:00; the afternoon meeting at the Palmer House at 2:00; and the evening meeting, dinner in honor of the guest speaker, at the Palmer House at 7:00. The subjects are:

Friday Morning, December 11, 1942

COMPOUND Injuries"—WILLIAM R. CUBBINS, Professor of Bone and Joint Injury, Loyola University School of Medicine, Staff, Cook County Hospital.

"Head Injuries"—HAROLD C. VORIS, Clinical Professor of Surgery, Loyola University School of Medicine, Attending Staff, Cook County Hospital.

"Sulfon Drug Therapy"—ITALO F. VOLINI, Professor of Medicine, Loyola University School of Medicine, Attending Staff, Cook County Hospital.

"Demonstration of Cases"—JAMES J. CALLAHAN, Associate Professor of Surgery, Loyola University School of Medicine, Attending Staff, Cook County Hospital.

"Vascular Injuries in Reference to War"—RAYMOND W. MC NEALY, Associate Professor of Surgery, Northwestern University Medical School, Chief Surgeon, Wesley Memorial Hospital, Attending Staff, Cook County Hospital.

"Contaminated Wound with Gas and Tetanus"—GEORGE L. APFELBACH, Assistant Professor of Surgery, Northwestern University Medical School, Attending Staff, Cook County Hospital.

Friday Afternoon, December 11, 1942

THE Problem of Nutrition in Industry"—M. H. KRONENBERG, Chief, Division of Industrial Hygiene, Illinois State Department of Health.

"Mouth to Mouth Absenteeism"—HAROLD A. HOOPER, Chief Dental Consultant, C. M. St. P. & P. Railroad.

"Visual Testing in Industry"—HEDWIG S. KUHN, Ophthalmologist, Hammond, Ind.

"Hygiene Supervision of Ordnance Plants"—MAJOR W. J. MC CONNELL, Medical Corps, War Department, Chicago.

Friday Evening, December 11, 1942

WAR Surgery"—COLONEL NORMAN T. KIRK, Medical Corps, Commanding Officer, Percy Jones Hospital, Battle Creek, Michigan; formerly Director of Surgery, Army Medical School, Walter Reed Hospital, Washington, D. C.

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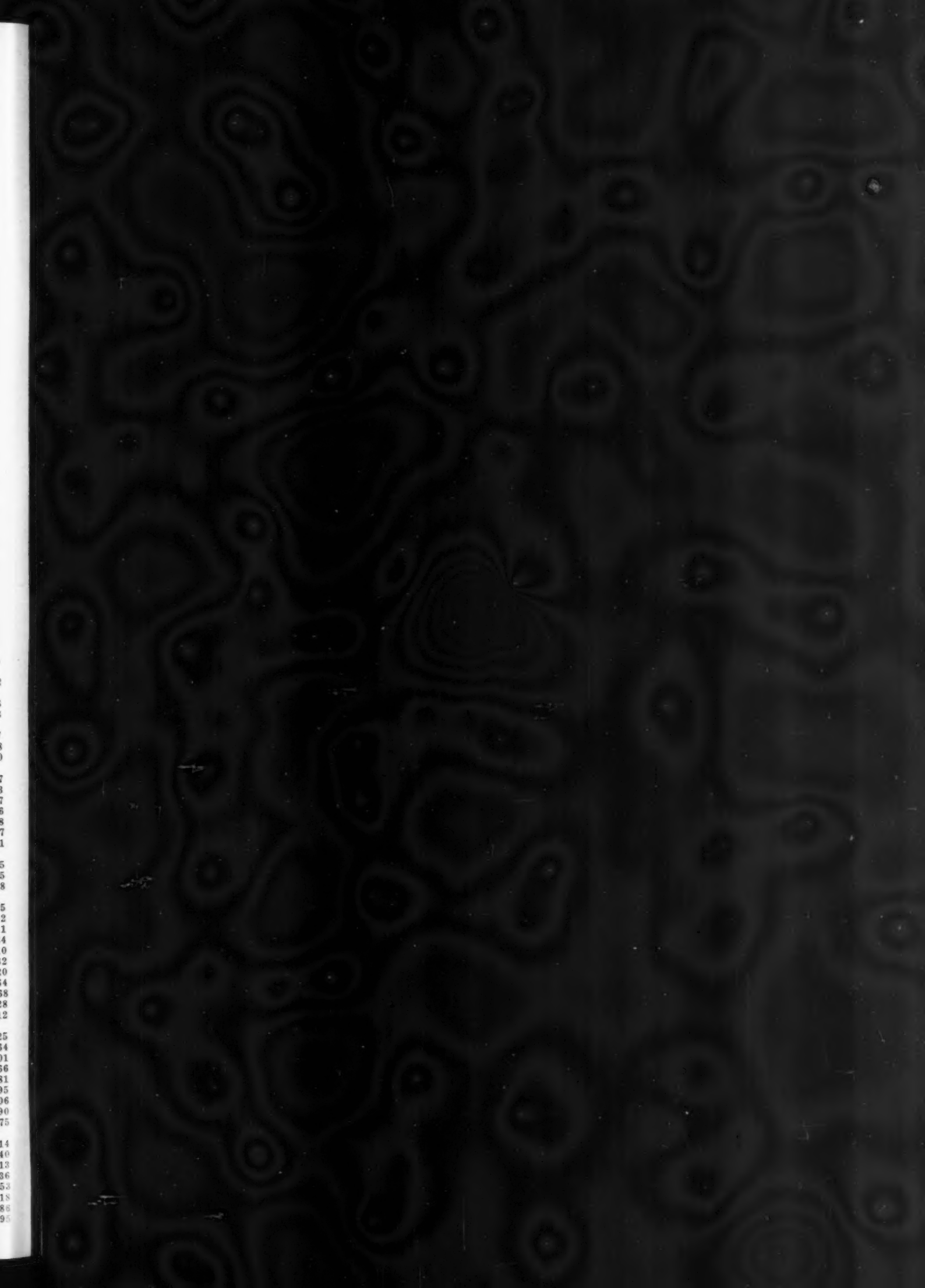
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